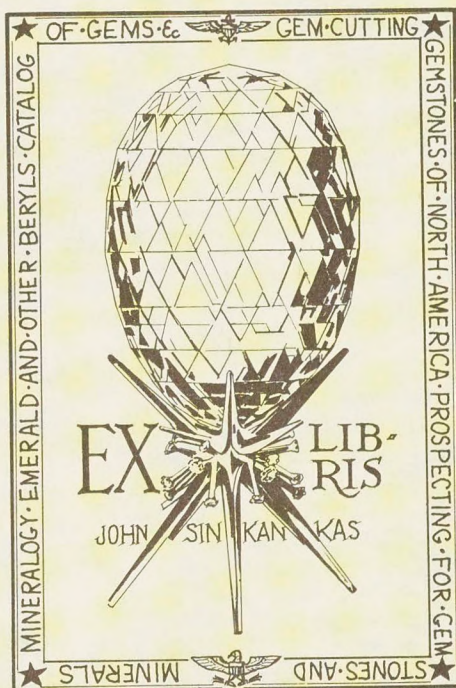


GEM MINING IN THE MOGOK STONE TRACT
1927 UPPER BURMA
J. Coggin Brown

JOHN SINKANKAS

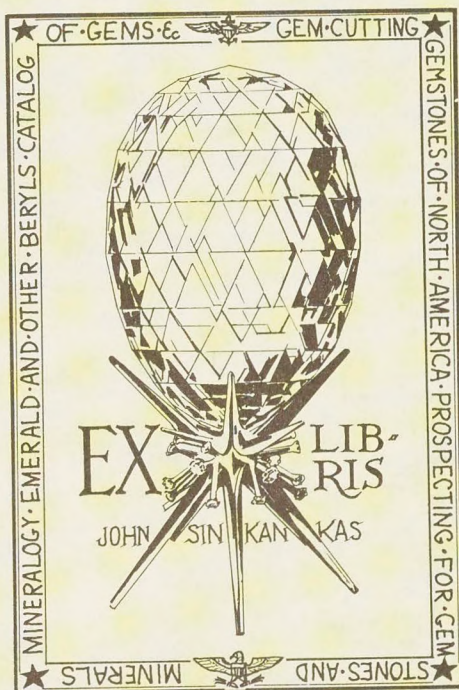




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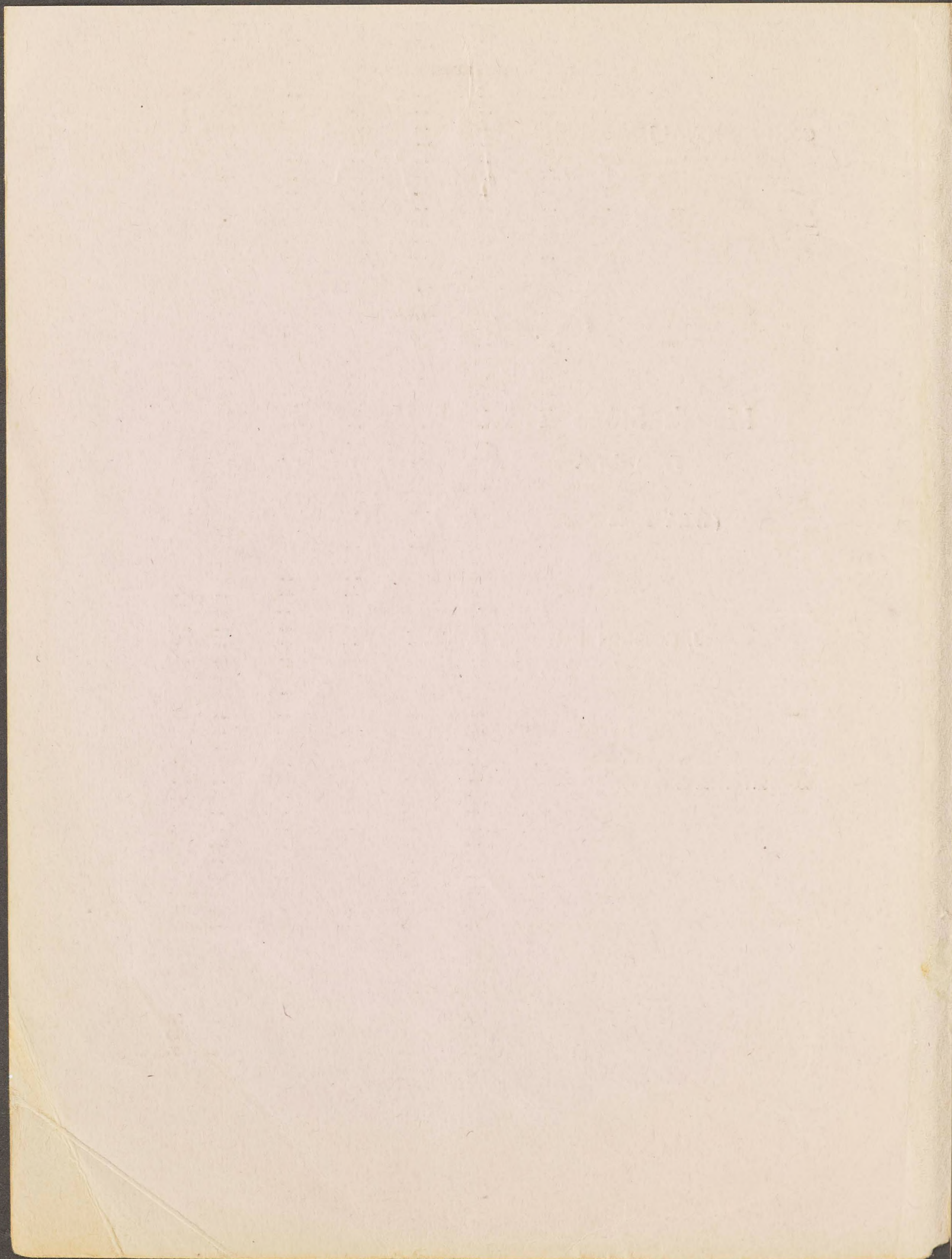
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GEM MINING
IN THE
Mogok Stone Tract of Upper Burma
From the Annexation to the Present Time
(With some Suggestions for Future Operations)

BY
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Gem Mining in the Mogok Stone Tract of Upper Burma.

INTRODUCTION.

THE royal edict of King Nuha-Thura Maha Dhama-Yaza, a translation of which is given below, proclaiming the annexation of the original Mogôk Stone Tract is dated 1597 A.D. (959 B.E.), but precious stones had probably been mined therein for a long period before that time. The writings of the earlier European adventurers (Lodovicio di Varthema, 1496 and Ralph Fitch, 1586) indicate that the industry was well established then.

"Shwe-wa-myo (Ava) was established on 12th Labyigyaw Tawthalin of 959 B.E. It is Translation of Royal Order of 1587 A.D. the Ratna Pura (Ratna=Gem, and Pura=City). Mogôk and Kyatpyin are names for gem. They should be included in the Shwe-wa-myo. These two were part of Momeik Sawbwa's States but should be excluded and Tagaungmyo with its surrounding villages be included in the State instead.

It is ordered that the Momeik Sawbwa should take possession of Tagaungmyo and that Mogôk and Kyatpyin be given over to Shwewamyo. The *Wuns* concerned must take over the rubies with a list of all descriptions (big and small) and pay into the Government Treasury.

No appointments whatever are therefore to be made by the Sawbwa to Mogôk and Kyatpyin which have been given to Shwewamyo in exchange for Tagaungmyo.

NAKHANDAWPYAWGYIMA.

5th Thadingyut Labyigyaw, 959 B.E.

Another proclamation in 1783 A.D., during the reign of Bodawpaya extended the boundaries of the tract and they continued to be moved outwards until at the time of the annexation, they enclosed what is practically the present Mogôk Subdivision of the Katha Township and consisted of the three *sos*, or jurisdictions of Mogôk, Kyatpyin and Kathe.

The best and largest stones were always regarded as the perquisite of the king and in earlier days the taxes which it was the duty of the *so-thugyis* to present to the Court thrice annually, were paid in kind. During the reign of King Mindon Min, however, payments in silver were offered by competitive applicants for the Governorship of the Stone Tract for the sole right to purchase stones, and so forth. A race of hereditary miners had evolved who carried on their occupation freely at first but later, suffered from the exactions of the *so-thugyis*. King Mindon Min's action is said to have started the decline of the industry, as the sum demanded for the lease had risen to rupees 2½ lakhs in King Thibaw's reign. "Had it not been for the annexation taking place about that time", writes Mr. E. C. S. George, "as most people consulted agree, the Stone Tract would have been almost deserted."

The conditions ruling at the annexation are not entirely a matter of historical interest, for, with modifications to bring them into line with the principles of equity, they formed the foundation on which the Upper Burma Ruby Regulation of 1887 was built up and on which the original lease of the Burma Ruby Mines, Limited, persisting with little alteration up to the present time, was framed.

The following extract from the Gazetteer of the Ruby Mines District describes the state of affairs just prior to the annexation :—

In what is now known as the Mogôk Subdivision the *thathameda* system which prevailed in other parts of Upper Burma was not in force. The Stone Tract was treated practically as a private appanage of the Burmese Kings, and the right to obtain revenue therefrom was farmed out, the *so-thugyis* being unrestricted both as to the total amount of revenue to be raised by them and in regard to the methods by which they raised it, so long as they produced what the lessee required. As a consequence, the demands on the people were irregular and capricious, and just prior to the annexation when Nga Si, afterwards Mogaung *Wun*, held the lease, the people were so much harassed to meet his demands that there was serious danger of the whole of the tract being depopulated.

The *so-thugyis* were appointed by the Crown, or by Ministers in the King's behalf. Their function was to collect and arrange for the ruby revenue, just as *myo-thugyis* or *thugyis* collect other revenues, all over Burma. They wielded wide magisterial and administrative powers and sometimes they were for years together the only representatives of the Government or of authority on the Ruby Mines plateau. For some years before the annexation the mines were managed direct on behalf of the King by a Mandalay nominee, or farmed to the highest bidder, but the revenue was still collected through the *so-thugyis*, who were generally given a free hand so long as they produced sufficient money.

So far as can be ascertained the total revenue obtained by King Mindon from the Ruby Mines during the time his officials managed the mines direct, was about one lakh of rupees a year. King Thibaw obtained a somewhat larger sum by leasing the mines, but his attempt to get 2½ lakhs nearly ruined the industry.

The lessee or *so-thugyi* possessed an option to purchase all gems not reserved under the Royal Prerogative and if he could not come to terms with the owner, the stones were sent to the Ruby Mart at Mandalay, the owner paying various dues, such as the "Seal Tax" and the "Export Permit," in addition to 25 *per cent.* on the estimated value of the rubies, which, of course, went into the pocket of the lessee. The latter also collected a "House Tax" and an irregular cess, not related in any way to *thathameda*, levied at suitable moments to suit the fluctuations of the industry. The leading dealers were forced to borrow funds at exorbitant interest from the lessee who also augmented his income by imposing rates on the local bazaars and farming out the gambling houses.

Mogòk was occupied in December 1886. In March 1887 the Chief Commissioner visited the town and discussed the question of the administration of the mines with the Deputy Commissioner and with Mr. George Streeter, who was already negotiating for a lease. In October of the same year the Upper Burma Ruby Regulation (XII of 1887), a Regulation to declare the law relating to rubies and other precious stones, came into force. This enactment empowered the Local Government to notify the Stone Tracts and to make rules regarding the mining, cutting, possession, buying, selling and carrying of precious stones and to grant licenses for any of these purposes. Clause 5 (2) of the Regulation is an important one which permits Government to compel a licensee to either—

- (a) sell at his own valuation to a lessee, all the gems which he may find, or,
- (b) pay on that valuation to that person such duty as Government may direct.

The clause thus embodies the principal privilege of the *so-thugyi* of the Burmese régime. The Regulation also contains elaborate rules designed to prevent illicit mining and restrict theft.

In November 1887, the Mogòk Stone Tract was constituted. It is contained within the boundaries of the existing Mogòk Township which enclosed the older Burmese Townships of Mogòk, Kyatpyin and Kathe. The Rules made under the Regulation and applying specifically to the Mogòk Stone Tract were published in October 1897.

It is necessary to trace briefly the trend of events during the intervening period until the first lease was granted. From the beginning registration was adopted to check illicit mining and annual license fees of Rs. 50 were levied for each *hmyaw*, Rs. 25 for each *lu* and Rs. 12 for each *twinton*. All the gems mined under the license had to be brought to the lessee, who had the option of purchase. Ruby sales were held monthly by the Deputy Commissioner at which licensees were required to offer their finds to Streeter & Co's. Agent. If the latter bought the parcel, he was required to pay Government 30 *per cent.* of its price. If he did not do so the parcel was sealed up on the spot and sent down to Mandalay there to be publicly auctioned. The underlying principle of the scheme of administration adopted thus followed closely the theory of the older Burmese system without any of its abuses.

The Upper Burma Ruby Regulation
of 1887.

Administration of the Gem Industry
between 1887 and 1889.

This procedure apparently lasted until 1889 when Messrs. Streeter & Co. were recognised by the Secretary of State as the lessees of the whole Stone Tract. Exaggerated views regarding the value of the ruby-bearing gravels prevailed widely at this time ; fantastic stories of the wealth of the deposits were circulated ; the words " Precious Stones " deceived the specialist and the public alike and as a result, competitive and prospective lessees offered rents for the mines which future events were to prove to be higher than was justifiable for such a speculative business. The industry was thus burdened from its commencement by heavy charges which had to be met from capital. Funds which should have been spent in legitimate development thus went straight into the Treasury where they were doubtless acceptable enough at the time. The administration of those days is in no way to be blamed for this. The original concessionaires agreed to pay these sums and the mistake was theirs.

Erroneous early views of the Industry.

Before the first lease was granted, Mr. Barrington Brown was sent out by the Secretary of State for India to report on the industry. I have not seen his report but certain extracts from it appear in the prospectus of the Company. According to these the Ruby Tract proper, consisting of country occupied by mines then at work and old abandoned ones, covered an area of 66 square miles in 1889. Mr. Brown found it impossible to state what the pre-annexation annual yields had been, but believed they were large. He concluded that " although it is impossible to fix a money value to the Ruby Mines from the imperfect data at hand, yet I can confidently say that the property is a most valuable one and capable of yielding a large amount of wealth." In this conclusion Mr. Barrington Brown was correct, for gems to the value of over 3 crores of rupees have been produced by the Company from quite limited areas. The native miners may, in addition, have produced an equal amount which would work out to a total of approximately one million pounds worth for each ten years. He did not foresee, however, that onerous taxation in the early days, coupled with much misdirection of energy and a strangling control by a non-technical Board of Directors in London, would prevent this wealth being obtained with less than the minimum profit, usually expected in such mining ventures, or lead to the liquidation of the concern after it had worked out a few alluvial patches in its enormous lease of 600 square miles. Mr. Barrington Brown made two suggestions :—

Barrington Brown's Report.

(a) that various valleys in the district could be drained and the gem-bearing gravel readily extracted ;
(b) that methods of hydraulic mining could be applied on a large scale to deal with the extensive deposits of hill wash.

His first suggestion has been followed by the draining of the Mogôk, Kathe and other valleys, but his second one, perhaps the more important of the two in the present writer's opinion, has never yet been carried into effect on anything like a comprehensive scale.

Various offers are said to have been made for the mines, Messrs. Gillanders Arbuthnot & Co., sent up Mr. Danson to report on them and a Mr. Morritz Unger actually mentioned £400,000 annually as the price his friends were prepared to offer. They, too, were apparently under the erroneous impression that Mogôk would prove a second Kimberly.

PART I.—THE FIRST LEASE.

An Indenture was signed on the 22nd February 1889, between the Secretary of State for India and Mr. G. S. Streeter and his associates. This lease was for a period of seven years and did not come into operation until the 1st November 1889. For the intervening period an extraordinary license was granted.

The lease was subject to the provision of the Upper Burma Ruby Regulation of 1887 and the Rules to be made thereunder. It granted to the lessees an exclusive right to buy and to enforce the sale of all precious stones raised by holders of ordinary licenses,

Privileges of the First Lease.

existing or future, within the Mogôk Stone Tract or at the option of the lessees to receive under section 5, sub-section (2) of the Regulation and to enforce the payment of a duty of 30 *per cent.* from the licensees of the valuations placed by the latter on the gems they had discovered.

It was provided, however, that if the Chief Commissioner thought it desirable that an ordinary license should be granted at an annual rent, instead of upon the condition mentioned in section 5, sub-section (2), of the Regulation, it was lawful for him to grant licenses under such rents and conditions as he with the concurrence of Streeter & Co., might prescribe.

The annual rents so obtained were to be taken by Streeter & Co., in lieu of the rights already outlined (*i.e.* the sole privilege of buying all gems or enforcing the duty of 30 *per cent.* on them). As far as I can gather the rights conferred in the earlier paragraph were only exercised for a very short period under the first lease and not under any of the later Indentures, probably because it proved impossible to enforce them in practice. The Company has then throughout its history, been content to operate under the alternative clause and collect the rents brought in by the native licensees.

The other privileges which the lessees enjoyed may be summarised as follows :—

- (1) An exclusive right to buy all stones confiscated under the Regulation, at the valuation of the local Deputy Commissioner, or, at their own option to receive 30 *per cent.* of the sum obtained by Government on selling the stones.
- (2) An exclusive right to the grant of an extraordinary license to mine precious stones by any methods, at any unoccupied place within the Mogôk Stone Tract, which had not been reserved for native miners, who possessed rights in "*ludwin*" and "*hmyawdwîn*" workings and who were entitled to be provided from time to time, with land for such purposes.
- (3) Further grants which need not be considered here include liberty to make roads, etc., power to take and use water and to cut and use timber.

For these rights the lessees agreed to pay a yearly rent on royalty of four lakhs of rupees and a further sum of one-sixth part of their net annual profits.

Conditions of the First Lease.

The exercise of these rights was subject to fifteen special conditions as well as to the obligations of the Ruby and Forest Regulations. The conditions of importance from the mining standpoint are given below :—

- (1) No mining was to be carried out within 10 yards of any claim for which an ordinary license had been granted, without the consent of the Deputy Commissioner.
- (2) The lessees were not entitled to mine for metals, coal or minerals other than precious stones, but were given the first refusal of a lease to work such, in the event of discovery.
- (3) The directions of the Deputy Commissioner regarding the disposal of tailings were to be obeyed.
- (4) Accounts of all rents, etc., received from ordinary licensees and of all stones purchased or found, and of all moneys paid for stones or received by their sale, of the fair, estimated value of stones kept in stock, of the rent, working and administration expenses, were to be kept in prescribed forms, submitted when required, for inspection and subject to be investigated and audited by an officer of the Accounts Department.
- (5) An Annual Income Account was to be delivered to the Secretary of State on which Government's share of the net profits was to be based. An Arbitration clause provides for disputes regarding items in this Account.
- (6) The cost of any special preventive or protective civil establishments was to be borne by the lessees.

- (7) Disputes between the lessees and native miners were to be decided by the Deputy Commissioner with a right of appeal to the Chief Commissioner.
- (8) The Deputy Commissioner had the power (subject to appeal as above), to grant new ground to native miners whose *hmyaw* or *ludwins* were exhausted.
- (9) The Deputy Commissioner could permit the lessees to occupy land for the purposes mentioned in the lease, not inconsistent with the Ruby and Forest Regulations.
- (10) The lessees were at liberty to assign their rights with the previous consent of the Secretary of State, to any Company domiciled in the United Kingdom, or in India, with the consent of the Governor-General in Council.
- (11) Any Company to whom such assignment was made must accept the conditions of this lease and shall not, without the previous consent of the Secretary of State engage in any other business in Burma.
- (12) Another clause permitted the Secretary of State to cancel the lease in the event of non-payment of rents or profits.
- (13) The lessees were entitled at the expiration of seven years to a renewal on terms to be mutually agreed upon, provided the Local Government had not given six months' notice of its intention to take over the mines, or had not received from a third party, a higher offer than the lessees were willing to make.
- (14) An Arbitration Clause dealt with the procedure for the valuation of machinery, buildings, stones, etc., properly the subject of compensation, but excluding works the cost of which had been entered in the income account, in the case of Government, or a third party, taking over the workings.
- (15) Finally, it was agreed that the Judicial Commissioner, Rangoon, should act as arbitrator in the event of disputes arising regarding the interpretation of the lease.

Streeter and his associates together with a concern known as "The Exploration Company, Limited," which apparently possessed an interest in the concession, sold the lease to the Burma Ruby Mines, Limited, for £55,000. The Company was floated on February 27th, 1889 (five days after the lease was signed with the Secretary of State). Its capital was £300,000 in £1 shares divided into 299,000 ordinary shares and 1,000 founders' shares. The latter were not entitled in any year to any dividends until 15 *per cent.* had been paid on the nominal value of the ordinary shares, after which the surplus profits were to be divided in two equal parts between the founders and the ordinary shares. All the founders' shares and 99,000 ordinary shares were subscribed for and allotted in full before the list was opened by Messrs. N. M. Rothschild & Sons on the 27th February 1889. The terms of subscriptions were as follows :—

Five shillings per share payable on application and five shillings on allotment ; further calls to be made as required, at intervals of not less than three months, in amounts not exceeding five shillings per share.

The original directors were Sir Lepel Griffin, K.C.S.I. (Chairman), Reginald Beech, Robert English, (a Director of De Beers Consolidated Mines, Limited), F. A. Gillan, an ex-Manager of the Bank of Bengal in Rangoon, G. B. C. Leveson (of Pittar, Leveson & Co.), Sir John H. Morris, K.C.S.I. and G. S. Streeter.

Extraordinary scenes witnessed the floatation of the Company as the following extract from the *Financial News* of February 28th, 1889, shows :—

" If St. Swithin's Lane had been a ruby mine itself the scene witnessed there yesterday morning could not have been more remarkable. The crowd around New Court was so dense that Lord Rothschild and other members of the house were unable to get in by the door. So a ladder had to be got, and the spectacle was seen of a number of great financiers entering their own office in a burglarious fashion. The clerks had to be smuggled in by a back

entrance behind the Mansion House. The surging crowd in front drove a telegraph boy right through the window of a baker's shop opposite, the poor fellow being rather severely hurt. The fortunate possessors of Ruby Mine application forms, which were being hawked at five shillings, had to pass between files of policemen to hand in their applications. The next time the Messrs. Rothschild make an issue, it would be well for the police to arrive on the scene before the stags."

The Company thus started its career with a paid up capital of £150,000.

Early Difficulties of the Company.

All kinds of unforeseen difficulties were encountered during the first few years and an unusual amount of time was spent in preliminary operations. The construction of an unmetalled road to the mines through a mountainous, forested and unhealthy tract was completed late in 1889. Machinery and stores had to be bought and transported, a suitable staff selected and assembled and houses, offices and machine sheds built. Some plant was taken over from the original concessionaires. Other machines, similar to these then used on the South African diamond mines, were sent out from England together with pumps and rails. By the end of the first year (1890) none of these had arrived in a complete state. The staff suffered severely from the climate. The first Engineer-in-Chief was not sufficiently experienced for the special work involved. Thus, the first year's work necessitated a large outlay and no returns and further call of 5s. per share had to be made.

The Institution of an Open Gem Market.

It is necessary to make a digression here, for in 1890 important changes were introduced in the administration affecting the native miners. Soon after the occupation of Mogòk a formal registration of native miners was introduced and annual license fees were charged—Rs. 50 for each *hmyaw*, Rs. 25 for each *lu* and Rs. 12 for each *twin-lon*. All the gems found had to be brought to the lessees, who possessed the option of purchase. Ruby sales were held monthly by the Deputy Commissioner, at which licensees were required to offer their finds to Streeter's agent. If the latter bought the parcel he was required to pay Government 30 *per cent.* of its price. If he did not do so it was sealed up, sent down to Mandalay and sold by public auction. After the grant of the first lease native mining went on as before but the system which required them to offer all their gems to the Company proved unworkable, which is not surprising. Without the arbitrary compulsion of the Burmese régime it was impossible to force miners either to sell to the Company at the latter's valuation, or, to pay it 30 *per cent.* of their own. The imposition of a fee *per workman* instead of *per mine*, together with the abolition of restrictions on sales in other words, the introduction of an open market for gems was discussed. At a meeting between Sir Charles Crosthwaite the Chief Commissioner, and Sir Lepel Griffin in February 1890, a monthly fee of Rs. 20 per workman and the removal of restrictions on sales were agreed to. This arrangement has persisted up to the present time and is embodied in the Rules under the Regulation, while it is laid down in the later leases granted to the Company that the fees shall not be reduced without their consent. From April 1900 until the end of the year, the license fees were collected by the Deputy Commissioner and paid to the Company (the first quarterly instalment amounting to Rs. 25,200). Thereafter the Company collected the fees and continues to do so to-day on behalf of Government. From the 1st April 1891 revised rules came into force, whereby the license was issued in the name of the owner who paid a fee of Rs. 20 per workman employed. In 1892 this was raised to Rs. 30 but the old rate was soon resumed. Under the 1891 Rules only the licensee had to be a native of the Stone Tract. The system of monthly payments in advance which prevails to-day was substituted for quarterly payments in 1894.

In 1890 Major Kunhardt arrived in Burma as Director-General and Chief Engineer of the Company. At this time a Paxman washing machine was in operation and a

First Operations of the Company.

Whitmore and Binyon machine in course of erection, to treat the ruby-bearing ground (*byon*) which had been found on Pingutaung Hill and on a lower spur known as Pingunyauk. Both these localities, which are near Kathe, were connected to the machines by a light tramway. *Byon* had also been found

at Kyaukpyu about $\frac{3}{4}$ mile west of Kyatpyin and at Tagaung-nandine, about a mile to the east of the same place. Kunhardt appears to have tried to make native methods profitable. Between January and April 1891 he sunk 652 pits into the *byon* which underlies the Mogôk valley at a depth of 20 to 30 feet. These gave 5,042 loads of *byon* which yielded 19,855 carats of rubies valued at Rs. 49,298 in the Paxman washing machine then erected there. The cost of winning these amounted to Rs. 46,864 excluding European supervision. Trenching the ground for the *byon* proved impracticable as water was reached at 8 feet. Pitting operations were of necessity during the rains.

The top of a small hill known as Kyauktaung about 2,000 yards north-west of Shwebontha, where the pitting experiment were carried on, was found to be covered with a layer of *byon* yielding two or three carts per truck load, but no other source of ruby earth was at that time known to exist near Mogôk itself. After a wire ropeway had been constructed to Kyauktaung Hill the locality was abandoned as barren. In 1893 numerous small veins and fissures had been found in the limestones of the surrounding hills from which 15 to 20 cubic feet of *byon* could be extracted per day, but considering that it was of poorer grade than that in the valley itself (20 cubic feet yielding on an average about Rs. 10 per day), it was decided that it would never pay the Company to exploit these.

These operations in the Mogôk Valley appear to have convinced the Company that it was an unprofitable deposit and in 1893 the headquarters were removed to Kyatpyin.

Pingutaung is a limestone hill over 5,000 feet high, about $\frac{1}{2}$ mile north-west of Kyatpyin. Mining Operations at Kyatpyin. Burmese legends regarded this hill as the original home of the ruby and credited it with fabulous internal riches, yet it is hard to understand why Colonel Kunhardt after his experience of the low values of the fissure deposits around Mogôk, should have attempted to develop underground mining here. A perusal of the old reports leaves the impression that the centre of the hill was regarded as a crater, a "pipe," a false analogy probably gained from a fanciful resemblance to the Kimberly diamond pipe. The hill was said to be almost honeycombed with fissures full of good ruby earth and their general direction to trend towards the centre immediately below crater-like opening near the top, which was supposed to be the mouth of a pipe running vertically through the mountain. Thirty or forty ancient *ludwins* from 150 feet to 200 feet deep existed on the top and in May 1890, Kunhardt embarked on his plan of opening up Pingutaung by two large adits driven through the solid rock and large enough to contain tram lines. He was probably encouraged in this enterprise, predestined as it was to failure, by the fact that the two large rubies which were sold in 1875 for £20,000 and £10,000 respectively, were found in fissures in this hill. By 1892 the main gallery had advanced 300 feet and revealed nothing while the adit level, then 350 feet in length, had cut several fissures filled with *byon* which were not tested for lack of transport.

Colonel Kunhardt was succeeded in 1893 by Colonel Conway Gordon who, sharing his predecessor's belief in a large pipe of *byon* in Pingutaung, pushed on the underground workings in a vigorous attempt to reach it. Compressed air drills were installed and ropeways and tramways connected but it is unnecessary to trace this unfortunate enterprise any further, for in 1895 it was totally abandoned.

In only one case were small fissures of *byon* encountered and the cost of extraction, Rs. 11 per truck, was too great to be profitable.

Pama lies on the eastern slopes of Pingutaung. To reach the *byon* deposit here a timbered gallery, 150 feet long, was commenced in 1891 and the erection of a Whitmore and Binyon washing machine completed. The *byon* was taken to this by means of a ropeway. In 1893 Conway Gordon reported that during the two preceding years the upper layers of the *byon* in this valley had been mined and that some 15,000 loads had averaged Rs. 6 per load which was enough to realise a profit if a sufficient number of loads could be obtained. At that time the most serious

difficulty of the Company was to find a large deposit of *byon* within a comparatively small area, fairly easy to wash and of a grade profitable enough to treat on a large scale. Gem-bearing gravel had been found to exist "in almost any quantity," but it was scattered about in small pockets and under conditions that made successful exploitation in a commercial sense, extremely difficult.

Deeper layers of *byon* were discovered about this time in the Pama workings lying beneath the portions which had been removed. Trial pits had proved this to be from 10 to 20 feet in thickness and of a richer grade than the shallower stuff. Conway Gordon commenced a low level adit to reach it and regarded these operations as a test case, for although it was the only large deposit actually proved then, several other valleys around Pingutaung appeared to be identical with the Pama one.

In 1893 too, the upper workings at Pama, which had up to that time been the only successful ones undertaken by the Company, were exhausted after yielding *byon* worth $1\frac{1}{2}$ lakhs of rupees on an average value of Rs. 4.5 per truck. The second adit, 40 feet below the upper one, was driven 560 feet through solid rock and reached the *byon* in June 1894. Local conditions were not conducive to cheap mining and not more than 50 or 60 trucks could be obtained per day. It was recognised that this was a doubtful proposition and that values would have to be high to make the venture successful.

In 1893, Mr. A. H. Morgan who was originally sent out by the Streeter
 Morgan's Experiment at Syndicate took charge of the mining operations,
 Tagaung-nandine. He proved to be an engineer of great skill and
 resource, indeed, it is not too much to state that any

measure of success which the Company has had in the course of its existence is mainly due to his work. Morgan appears to have already realised the mistakes of his predecessors, and to have come to the conclusion that the only hope of success lay in the large scale treatment of the gem-bearing ground at as small a cost as possible. He decided to tackle the water problem in the valley deposits, which had hitherto proved an insuperable obstacle.

The Tagaung-nandine valley, some two miles from Kyatpyin was selected first. It, in common with the other valleys, was thoroughly waterlogged a foot or two below the surface and this effectually prevented the extraction of the gem-bearing ground on a large scale. A timber shaft was sunk in which pumps could be installed and by raising the water through this, it was found possible to open up a large trench, strip the 10 or 11 feet of barren overburden and remove the *byon* in a dry condition. Both the pumps and the washing machinery were operated by water power and the scheme was an unqualified success from the commencement. Major Patten-Bathune who visited the district in 1894, acting on behalf of the Directors, authorised a similar experiment in the Mogôk Valley and it thus came to pass that successful work was commenced there later in 1894, although the earlier engineers in charge considered the water problem insoluble. The earlier mining operations in the Mogôk Valley in 1892 and up to March 1893 when they were abandoned had shown a loss of 50 per cent.

Morgan's Tagaung-nandine experiments proved that the *byon* could be won, washed and sorted at a total cost of about Rs. 2 per truck, or only a fraction greater than the cost of transport and washing alone of the *byon* from the Pingutaung and Pama workings, moreover, as the *byon* was loaded directly into trucks and sent straight to the machines the chances of theft were very much less. It was believed then that if an average of 20,000 trucks *per mensem* could be obtained from the valley in workings in Tagaung-nandine and Mogôk, as both Messrs. Morgan and Wynne, another engineer who had lately joined the Company confidently predicted, then an average return of Rs. 3 per truck, allowing for the royalties received from the native miners would pay all expenses of the Company in Burma, while if the value rose to Rs. 4 per truck, a fair profit would be shown. The earlier experience at Mogôk had shown an average value of about Rs. 7 per truck and the cost of working was the only drawback to success.

The year 1895 and 1896 were profitable to the Company. The costly Pingutaung and Pama tunnelling schemes had been abandoned. Morgan's

methods were energetically prosecuted in the Tagaung-nandine valley with good results. The Luda valley in the same region was opened up in the same fashion while work was extended at Mogòk. By June 1895 the Shwebontha mine was starting to yield satisfactory returns there and for the first time in its history the income of the Company sufficed to cover all its expenses in India and Burma, to pay the reduced rent of two lakhs of rupees and to show a closing balance on the right side of the account at the end of the year. In 1895 the cost of winning and washing *byon* in the Mogòk Valley had been reduced to Rs. 2 and although the old Tagaung-nandine mine was worked out after showing a net profit of Rs. 2,60,000 the extended operatives at Mogòk itself sufficed to fill its place.

A statement is given below showing the financial position of the Company during the period of the first lease :—
Financial affairs under the First Lease.

Lease of 22nd February 1889.

(Rent of Four lakhs and one-sixth net profits.)

Year.	Royalty Receipts.	Rent paid to Government.	Balance of Company's Income and Expenditure Account.	
			Profit.	Loss.
(1)	(2)	(3)	(4)	(5)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1890 ...	921 10 2	9,479 3 4	...	19,771 7 10
1891 ...	9,342 11 7	31,572 2 0	...	44,027 18 5
1892 ...	13,627 13 7	27,829 17 2	...	32,878 11 9
1893 ...	17,493 15 0	3,428 16 5	...	10,304 13 7
1894 ...	20,585 4 1	12,708 6 8	...	16,689 9 2
1895 ...	21,395 13 4	11,276 0 10	95 3 0	...
1896 ...	28,277 5 10	11,250 0 0	17,194 18 10	...

The adverse balance of the Income and Expenditure Account in 1896 was thus £106,381-19-11.

Originally the £1 shares of the Company were 10s. paid. After the first year's work a further call of 5s. was made and the second balance sheet showed the capital as £225,000.

The small amounts which were made by the sale of gems in the earlier years may be seen from the following figures taken from the Balance Sheets :—

Year.	Stones at Mines.	Stones in London.	Profit on Ruby Trading Account.
	£ s. d.	£ s. d.	£ s. d.
1890 ...	35 13 1	1,693 4 8	464 10 6
1891 ...	110 17 0	1,139 12 0	332 16 2
1892 ...	20 10 6	3,646 1 2	3,664 11 7
1893 ...	181 3 0	6,426 10 0	7,831 13 1
1894 ...	...	4,215 16 3	4,534 8 7
1895 ...	...	13,051 12 9	16,744 1 8
1896 ...	...	12,495 0 0	27,203 18 0

In the first year of its existence the Company requested that its rent might be remitted or deferred until it was in a position to pay it. The application was refused. In 1891 this was followed by a request for a reduction of the rent from 4 lakhs to 2 lakhs of rupees. In April 1892 Government sanctioned

Suspension of Rent under First Lease.

the suspension of 2 lakhs of rupees due to be paid on February 28th of that year. In 1893 Government approved of a further suspension of rent until such time as a more complete exploitation of the ground should have taken place. From 1st November 1889 to April 1893, 10 lakhs of rupees (£72,310) had been paid, while 4 lakhs were then under suspension. Further correspondence followed and in 1894 the suspension of the demand for four lakhs of the arrears due at the end of 1893 was sanctioned and also of two lakhs out of the four lakhs due in respect of each of the years 1894, 1895 and 1896.

PART II.—THE SECOND LEASE.

The first lease expired on the 31st October 1896 and the second one is dated the 18th February 1897. A sum of rupees 10 lakhs of suspended rent, was then due to the Secretary of State. The second lease was to run for a period of 14 years at a fixed annual rent of Rs. 3,15,000 payable in half yearly instalments *plus 20 per cent* of the net profits of the year's working after deducting rent, of the suspended rent, 4 lakhs were to be liquidated by the appropriation of half the declarable dividend in excess of 5 *per cent*, the balance of 6 lakhs to be remitted entirely on consideration of the waiver by the Company of all claims for compensation under the first (1889) lease. (Sir Lepel Griffin stated at the 8th annual meeting of the Company on July 23rd of 1896, that the Directors had offered to pay up the suspended rent of 4 lakhs at once if Government would reduce their share of the net profits from 20 to 10 *per cent*.)

The second lease contained a new and important clause to protect the interests of the native miners. It is to the effect that members of *any* family, mining in the Stone Tract prior to the acquisition by the Company of its rights, shall have an absolute right to the grant of ordinary licenses in accordance with the Rules of the Upper Burma Ruby Regulation. The situation of such land had to be approved by the Deputy Commissioner, but the Company was given an opportunity of objecting on the ground of interference with the reasonable extension of its own operations, before the Deputy Commissioner allocated the site. The Company were not entitled to object to the continuance of a license once it was granted for a particular site.

The second lease thus conferred important privileges on "hereditary miners" but it was not until 1906 that it was decided that they should consist of the following two groups :—

- (a) of the surviving representatives of the 44 persons who held *hmyaw* and *lu* licenses in 1888 and their direct descendants through both lines, and
- (b) of those who had given proof that they belonged to a family which practised mining before February 1889 (the date of the first lease) and had not abandoned the occupation for a period of three years.

The lists are kept at the Township Headquarters in Mogòk, at the commencement of 1926, list (a) contained 218 and list (b) 126 names.

Of the total loss of £123,576 up to the end of the first lease, over £96,000 was paid to Government in rent. On the other hand, if the Company had not been in existence, Government would have obtained over £111,643 in license fees, for at the beginning the Company did not issue all the licenses possible for fear of competition.

Steps were now taken to reduce the capital of the Company by cancelling sufficient to counterbalance the capital loss unrepresented by available assets plus a further £14,000 written off for depreciation of machinery, making a total loss on the seven years of approximately £120,000.

At an Extraordinary General Meeting on the 16th March 1897 the following resolution was moved :—

"That the capital of the Company which now consists of £300,000, divided into 299,000 ordinary shares of £1 each and £1,000 founder's shares of £1 each, be reduced to £180,000, divided into 299,000 ordinary shares of 12 shillings each (10 shillings paid up) and

1,000 founder's shares of 12 shillings each (10 shillings paid up) and that such reduction be effected by cancelling paid up capital, which has been lost or is unrepresented by available assets, to the extent of 8 shillings on each of the ordinary and founder's shares."

Many shareholders objected to the position created by the existence of the Founder's shares which were described as an inconvenient and invidious arrangement. However, after successive meetings the scheme was agreed to and was finally sanctioned by the Courts on 19th June 1897.

The engineers of the Company had now come to the conclusion that the proper way to treat the gem-bearing gravels of the valleys was to mine them on as large a scale as possible, after drainage on the lines laid down by A. H. Morgan. This system was pushed steadily ahead and land occupied by habitations and fields in Mogòk was purchased for mining purposes. Although very large increases in the total quantity recovered were registered with marked decreases in the cost per truck the value per truck showed a marked decline also owing to the fact that the rich ground had to be treated with the poor. This fall is exemplified by the following table :—

Technical Developments following the Second Lease.

	Years 1894-5.	1895-96	1896-97.
Number of trucks ...	61,080	148,740	366,739
Average per month ...	5,090	12,376	30,561
Value of rubies ...	Rs. 2,80,616	Rs. 4,75,059	Rs. 7,55,052
Expenses in Burma ...	" 3,08,145	" 3,85,437	" 4,74,813
Cost per truck ...	" 5.04	" 2.59	" 1.29
Value per truck ...	" 4.59	" 3.19	" 2.05
Profit on mining ...	" 27,529 (loss)	" 89,622	" 2,80,239
Profit per truck ...	" 0.45 (loss)	" 0.60	" 0.76

A new mining centre was opened at Kyauklongyi in the Mogok Valley in 1896. In the same year the Board decided to supplant steam by electricity developed from water power and a dam across the Mogòk stream was completed. The cost of fuel had risen to over £5,500 *per annum* which was more than the estimated cost of the original dam and hydro-electric installation. The latter commenced operations on the 5th of September 1898 and having brought about a saving of some £500 a month from the start, the Board decided to double the installation at once.

The high hopes entertained by the shareholders at the time of the reconstruction (June 1897) were doomed to disappointment for the work was carried on at a loss during the next two years, as the following table proves :—

Losses in 1897 and 1898.

Year.	Royalty Receipts	Rent paid to Government.	Balance of Income and Expenditure Account	
			Profit.	Loss.
(1)	(2)	(3)	(4)	(5)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1897 ...	22,534 10 0	18,437 10 0	...	8,019 16 3*
1898 ...	9,976 5 4	20,815 8 7	...	2,503 18 8†
1899 ...	14,233 0 8	16,674 11 10	4,321 11 9	...

* As a matter of fact the true earnings of the Company in 1897 approximated £15,800 and the loss was largely caused by the writing off of a sum of over £21,500 depreciation on machinery apparently for the first time. In addition to this, owing to the terms of the new lease, the Company paid in rent for the eight months ending 31st October 1896, the same as it did for each of the previous three years. In reality the profit was greater than that of 1896 (£17,000). I have seen it stated elsewhere that the loss was only £5,936-9-7 instead of the figure given which is taken from the balance sheet for the year.

† The loss in 1898 was actually £8,102-2-6 but was reduced to the figure given by a surplus from the Capital Reduction Account.

These lean years were due to causes outside the control of the Company.

Markets for Coloured Gems.

To understand them, it is necessary to consider the market conditions for coloured gem stones. In the first place, it is a limited market as is only natural in the case of a costly article of luxury and, again, it is peculiarly sensitive to the dictates of fashion. It is incorrect to compare the ruby market with the diamond market. A buyer, fortunate enough to possess the means of doing so, frequently goes on collecting diamond jewellery regarding it rightly as a form of investment. Such an individual having once purchased a ruby ring is probably content to leave it at that. Ruby jewellery is not collected and hoarded as diamond jewellery is.

The greater part of the rubies found at Mogòk belong to the poorer grades and are moreover quite small. One authority states that they average only about four to the carat. It is not generally realised what a very rare stone a large and perfect ruby is. A 10 carat perfect ruby is a most exceptional stone but diamonds of the same size are obtainable in quantity. It is for this reason that the ruby (speaking always of perfect stones) begins to rival the diamond in value when it is about 2 carats in weight, but over, that the ruby greatly exceeds the diamond in price.

The better quality rubies are disposed of in the London market, whence they reach the various Continental and American Centres. The poorer stones which form the bulk of the production and consequently the greater part of the Company's income are either sold in Calcutta, Madras or Bombay or disposed of at the mines in large parcels to dealers. They in their turn pass them on to cutters or to middlemen who again sell to peddlers who carry them all over the East.

In 1897 widespread famine conditions prevailed in India and trade of all kinds was affected. The luxury trades suffered most and the demand for gems in the Indian world almost entirely ceased. As it happened, and the Company were able to sell more stones than usual in London, but by 1898 their receipts from native royalties had fallen to £9,900 from the high figures of £28,000 in 1896.

The Company contended that the rent of 3½ lakhs under the second lease was fixed by Government at this sum because it was estimated to be about the amount which would be realised in royalties, as it happened it was fixed at a time when the royalties had reached their highest point. The Company then was forced to pay the rent out of mining profits which left the shareholders nothing. In 1898 the Directors proposed to Government that the prevailing rent of 3½ lakhs, less the cost of collection should be reduced to a maximum of 2 lakhs and that if the royalties should fall below that amount in any year, they should pay the amount received and no more. They further claimed a refund for the excess amount paid over royalties received.

On the 25th January 1899, the Secretary of State informed the Company that while he was not prepared to consider any permanent revision of the terms of the second (1897) lease he consented to remit one lakh from the rent of 1897 and one lakh from the rent of 1898, on the condition that the Company otherwise fulfilled its engagements under the lease and paid all rent due.

The small profit of £4,321 in 1899 (which would have been more but for the flooding of the Shwebontha Mine in the Mogòk Valley) was increased to £9,893 by the above remission.

This would have allowed of a 5 *per cent* dividend but the Board again approached Government and urged that the temporary remission already granted should be made a permanent reduction of rent and that the balance of arrears of four lakhs should be cancelled, thus relieving the Company from a drag on their future prosperity.

On the 7th September 1899, the Secretary of State determined (1) to remit the four lakhs of arrears due under the original lease, and (2) to reduce the annual rent from Rs. 3,15,000 to Rs. 2,00,000 subject to an increase in the Govern-

The Agreement of September 7th,
1899.

ment's share of the net profits from 20 *per cent.* to 30 *per cent.*, the reduction to continue for five years and being subject to reconsideration at the end of that term.

Most of the work in the earlier part of this period was concentrated at Shwebontha and Kyauklongyi Mines, both in the Mogòk Valley with the latter situated to the north of the former. Operations at Yaboo (Yebu ?) were suspended during the rainy seasons. Although the surface of the ground had been turned over by native miners in the past, they had never been able to reach any depth and the efforts of the Company's staff was concentrated on endeavours to obtain a large outturn of the deeper though poorer gravel. In 1900 we find the Agent writing to the Board as follows :—

"All our workings seem to point to the fact that the most valuable earth is the first layer of *byon* proper, say 15 to 25 feet from the top. Our deeper workings certainly pay and pay well too, but that is only because we turn over masses of ground so cheaply. The cream of the stuff is in the *byon* at the bottom of the Burmese *twinlons* and that is the ground from which the bulk of the royalties come. We ought to keep it for ourselves even though the royalties do dwindle."

The second unit of the hydro-electric installation commenced to function on 7th April 1900, both machines together yielding 240 horse power.

In 1901, two washing pans were working at Shwebontha, three at the Redhill mine close to it and one at Kyauklongyi to the north. The average throughout per pan per day of 20 hours was 672 trucks of *byon*. Another two-pan machine was erected at Padansho near Kyauklongyi, while preparatory stripping operations to open out a new mine at Chaungzone at the southern end of the valley were undertaken about the same time.

It is interesting to note that at this period although the Company had put a large quantity of gems on the market they had experienced no difficulty in disposing of every ruby they had found, with the exception of a few fine stones of great price.

In 1902 the Lieutenant-Governor reversed a decision of the local authorities and allowed the Company to take up land for mining purposes at Taroktan in the lower part of the Mogòk Valley close to the Shwebontha Mine, which had up to that time, yielded rubies valued at over £250,000. Taroktan was really a part of the town of Mogòk and the Company had to buy the land and settle the inhabitants elsewhere.

Profits were made continuously from 1899 to 1908 with the exception of the year 1903 when unprecedented floods washed away part of the pipe line of the hydro-electric plant and filled the mines with debris which had to be put through the washers. The electric supply was cut off for two months by this accident.

In 1904 a new lease came into force. The year was a prosperous one and both new mines of Chaungzone and Taroktan did very well.

Drainage still continued to be the great trouble of the Company and in 1904 Morgan's bold scheme of draining the whole of the Mogòk Valley by means of a tunnel blasted through solid rock, 100 feet below the surface and a little more than a mile in length, estimated to cost between £23,000 and £26,000, was put before the shareholders. Before its inception 300 of the 400 horse power of electric energy available from the hydro-installation were being consumed in pumping operations alone during the rainy seasons. The 50 acres of open cut mines then in existence had yielded rubies worth Rs. 85,00,000 and it was regarded as reasonable to assume that the remaining 177 acres would give a further Rs. 3,00,00,000 worth.

The following statement indicates how the output of gem-bearing gravel increased during this period :

Year.	Loads washed.	Cost per load in pence.
1899	652,456	12·86
1900	818,135	10·39
1901	947,444	10·29
1902	1,158,494	9·53
1903	1,500,124	8·0
1904	1,907,624	7·0

The position now was that the Company's operations were confined to the Mogòk Valley with a washing station at each side and one at either end and a fifth installation starting work.

The company seems to have had no labour difficulties and abundant supplies of Maingthas were apparently available at rates of about Re. 1 per day.

In 1899 the Company had paid its first dividend of 5 *per cent.* and its prosperity continued to increase reaching its high water mark in the years 1901 and 1902, as the following table shows :—

Year.	Royalty Receipts.	Rent paid to Government.	Profits paid to Government.	Balance of Income and Expenditure Account.		Amount of Dividends paid to Shareholders.
				Profit.	Loss.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1899 ...	14,233 0 8	16,674 11 10	864 6 4	4,321 11 9	...	7,475 0 0 (5%)
1900 ...	18,468 10 11	14,768 19 9	9,943 4 7	35,033 15 1	...	18,687 10 0 (12½%)
1901 ...	16,303 4 2	12,879 15 6	12,440* 2 9	39,845 5 0	...	26,162 10 0 (17½%)
1902 ...	19,105 12 9	12,821 3 7	12,652 10 2	40,367 16 10	...	26,162 10 0 (17½%)
1903 ...	12,765 0 2	13,407 2 4	774 3 2	...	1,544 13 3	...
1904 ...	23,460 13 8	13,459 4 1	9,253 12 7	29,898 5 7	...	22,425 0 0 (15%)

Year.	Rubies in Stock.	Balance of Ruby Trading Account.
	£ s. d.	£ s. d.
1900 ...	22,771 6 6	84,114 17 0
1901 ...	21,603 17 9	93,255 6 5
1902 ...	38,927 2 11	98,099 10 5
1903 ...	18,823 6 1	60,192 11 2
1904 ...	18,055 1 1	89,000 0 0

PART III.—THE THIRD LEASE.

As early as 1902, the Company had again approached Government and asked for a fresh lease in supersession of the second (1897) one embodying the reduced terms which had been agreed to under the temporary arrangement of 1900. The Government of India offered a new lease for 28 years at an annual rent of 3 lakhs of rupees *plus 30 per cent.* of the net profits but although the Company were anxious to secure a long tenure in view of their decision to undertake the Mogòk Valley Drainage Scheme, they considered these terms too onerous to accept. After some correspondence the following terms were agreed upon:—

- (a) The lease to run for 28 years from April 30th, 1904.
- (b) The Company to pay a yearly rent of rupees two lakhs.
- (c) In addition to the annual rent the Company to pay a sum equal to 30 *per cent.* of the amount, if any, by which its collections of rent, etc., from the native miners exceeded rupees two lakhs in any one year.
- (d) In addition to the aforesaid payments the Company to pay 30 *per cent.* of its net annual profits to Government.

This lease which is still in force (subject to certain modifications to be dealt with later), was signed on the 28th April 1904. In view of the attacks

which have been made on the Government of India by both Directors and shareholders of the Company since then, it is as well to record the opinion of the Board in 1904, that it was a favourable and equitable arrangement.

Financial Results, 1905 to 1909.

The following table gives the financial results of the years 1905 to 1909 :—

Year.	Royalty Receipts.	Rent paid to Government.	Royalties paid to Government.	Profits paid to Government.	Balance of Income and Expenditure Account.		Dividends paid to Shareholders.
					Profit.	Loss.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1905 ...	14,091 9 4	13,433 3 2	...	5,395 17 2	17,545 12 7	...	11,212 10 0 (7½%)
1906 ...	12,595 9 4	13,459 4 1	...	3,876 16 7	12,067 0 2	...	7,475 0 0 (6d. per share = 4·16%).
1907 ...	18,185 6 8	13,485 4 10	1,455 12 0	6,818 10 0	21,978 8 7	...	14,950 0 0 (1s. per share = 8·32%).
1908 ...	18,168 13 4	8,932 5 10	...	Nil	13,822 12 6	...	...
1909 ...	8,070 5 4	Nil	...	Nil	Nil	8,242 14 3	...

Year.	Ruby Stocks.	Ruby Trading Balance.
	£ s. d.	£ s. d.
1905 ...	21,139 8 10	90,122 17 6
1906 ...	19,825 5 3	87,666 0 8
1907 ...	28,328 8 5	95,137 4 2
1908 ...	38,354 4 0	90,756 5 0
1909 ...	50,884 6 7	46,604 12 9

No reasons appear to have been advanced for the decline in royalty collections from £23,400 in 1904 to £14,600 in 1905. They were governed by causes which the Company was neither able to control or explain.

In October 1906 a final call of 2 shillings per share was made to provide funds for the tunnel. This brought the capital of the Company to—

	£.	s.	d.
300,000 shares of 12 shillings each	...	180,000	0 0
Less call in arrears	...	150	18 0
		178,849	2 0

The year 1906 was not a very profitable one, mainly owing to the decrease in license fees. In 1904, 1,456 men were employed by native licensees, in 1905 918, and in 1906 only 787. The number rose however to 1,136 per month in 1907.

In 1907 Government received for the first and only time a sum of £1,455 under the clause of the third lease (1904) by which it took 30 *per cent.* of the royalty in excess of the sum sufficient to pay the rent of the mines.

The same year the Board applied direct to the Secretary of State soliciting a reduction of the Government's share of the net profits from 30 *per cent.* to one-sixth, on the ground that Government had received nearly three times the amount of sums which had been paid to the shareholders from the time of the formation of the Company. The application was rejected.

In the autumn of 1907 a very severe financial crisis broke out in the United States of America. Before this the ruby market was becoming depressed but after it happened the demand for rubies and for other gems completely ceased.

Depression in Gem Market of 1907.

The Company was unable to sell a single stone from that time up to the middle of 1908 though for the 20 years of its previous existence it had never experienced a stoppage of any duration worth mentioning. From February 1908 output was restricted by the cessation of night work at Mogòk and measures of rigid economy were introduced by cutting down the wages of coolies, etc.

Government were again addressed as to a further amelioration of the terms of the lease and agreed that the payment of the half-yearly rent due on the 2nd February 1908 and its share of the profits should be deferred until the market revived. This was conditional on the shareholders receiving no dividend until the arrears of rent were paid.

Suspension of Rent in 1908.

The depression had also affected the Eastern trade to a certain extent and diminished the local sales somewhat. The Board considered it would be bad policy to try and force their stocks on an unwilling market. Sir Carl Meyer stated at the annual meeting of the Company on June 30th, 1908, that the total production of rubies from all sources was not supposed to amount to more than about £200,000 per annum and the case was essentially different to that of the diamond trade.

Operations in 1909 resulted in a loss of £8,242. The stocks of rubies had risen from £19,800 in 1906 to £50,800 in 1909, while the balance of the ruby trading account had fallen from £90,700 to £46,600. Royalties dropped from £18,000 to £8,000 between 1908 and 1909. The home markets continued in a most depressed condition, only a single sale was effected in the course of a number of months and that at a reduction of 40 *per cent.* on the Agent's valuation in Burma. Fortnightly sales at the mines were however, not unsatisfactory and it was on the results of these that operations were kept going.

The Board approached the Secretary of State again and asked that the rent due on August 31st, 1908, and February 28th, 1909, should be postponed in addition to that due on February 28th, 1908 (already agreed to). They requested further that the rent should be remitted entirely, pointing out that in the altered circumstances it was impossible for the Company to continue paying 2 lakhs of rupees a year. They suggested that Government should be satisfied with the payment over to them of the royalties actually collected, less a collecting fee, until such time as the market recovered.

On the 8th November 1909 a circular letter to shareholders stated that while the Secretary of State was unable for the present (29th October 1909) to sanction the remission of arrears, he agreed, as a temporary measure, to accept in lieu of the fixed annual rent of 2 lakhs of rupees, payment of the royalties actually collected by the Company from native miners less ten *per cent.* collecting commission.

Company Arrangement to take Royalties in place of Rent.

The Chaungzone Mine which began producing early in 1902 from the ground in the valley about the junction of the Yebu and Oominyedwet streams was finally exhausted in June 1907. It yielded excellent returns up to the end when the *byon* was being won from corners and crevices previously overlooked. During the last four months of its existence it gave stones valued at Rs. 1,03,000, an average of Re. 1 per load. It was proposed to keep the Chaungzone washer employed from ground further up the Yebu stream towards Mintada.

Technical Progress between 1905 and 1909.

The drainage tunnel was finished in the summer of 1908 at a total cost of £40,746 or £7-7-9 per foot over 5,515 feet. It was a success from the first draining the whole Mogòk Valley to 100 feet, leading storm water quickly away, preventing flooding and opening up lower levels of *byon* for extraction. Further, it freed 250 to 300 horse power previously used in pumping for other purposes.

(Unfortunately the tunnel was blocked by a fall in 1925 and the Mogòk Valley is now a series of large lakes.)

In 1905 work appears to have been started in the Kathe Valley which was reported to be promising well. In the same year a new dam was built at Pamadeik and a new washer erected at Padansho. (The Padan *chaung* is a small tributary of the main stream about $\frac{3}{4}$ mile to the north-east of Mogôk town.)

In 1908 and 1909 the Company was put to heavy expense in expropriating the people from the centre of the town for the extension of their operations. It is noteworthy that although a bazaar and several hundreds of houses were removed not a single law suit was occasioned.

The depression in the gem market during this period, necessitating as it did, restricted output, reduction of wages and strict economy, naturally prevented any new noteworthy developments.

The following table gives the number of loads washed and their cost for the period :—

			Pence.
1905	...	1,773,129	8'4
1906	...	1,890,944	7'7
1907	...	Figures unobtainable	
1908	...	2,033,616	7'6
1909	...	1,071,166	7'9

These truckages were divided between five washing mills, each fitted with two main pans and a safety pan. In 1907 it was reported that the cost per truck had been almost the same for two years, *viz.*, 0'506 of a rupee for that year as compared with 0'526 rupee the year before and 0'470 the year before that. It practically amounted to 8 pence per truck.

The value per truck was 0'75 = 1s. and the profit 0'25 = 4d. on a profit of Rs. 251 for every 1,000 trucks washed.

The Directors of the Company continued to press on the Secretary of State that the arrears due to Government for rent and for its share of unrealised profit should be entirely remitted, to enable the Company to apply its cash resources to the development of new ground, which was recognised to be a policy of the utmost importance but which the Board were unable to adopt until they received an assurance that the deferred liability to Government would not be enforced.

Small profits of about £1,000 were made in 1910 and 1911 while the third year, as the table given below shows, registered a profit of £7,600 odd, which permitted the shareholders a small dividend in 1912, the first they had received for five years and the third from the last they were to receive in the remaining 15 years before the Company was liquidated.

It is noteworthy that a somewhat larger profit might have been shown in 1910 but the depreciation in the market prices of rough rubies in the preceding three years had amounted to almost 50 *per cent.* and it was essential to write down the value of the unsold stock.

In 1910, as in previous years of the slump 75 *per cent.* of the products of the Ruby Mines Company, were sold locally and only 25 *per cent.* was sent abroad. The local sales kept the business going and practically provided all the money for the working expenses of the mines. Proposals were made about this time that the Company should shut down but the Board considered them premature and inadvisable especially as great distress would have been caused at Mogôk.

The shareholders were informed by a circular, dated the 27th January 1911, that the Secretary of State consented to relieve the Company from the payment of £4,713-14-3 representing Government's share of accumulated profits, but that he did not see his way clear to remit the arrears of rent and percentage of royalties, over two lakhs of rupees, amounting together to a sum of £19,228-7-7, the payment of which therefore remained in abeyance.

Regarding the temporary arrangement by which in lieu of fixed payment the Government had been receiving during the two years ending February 28th, 1911, the actual royalties collected from native miners, the Secretary of State sanctioned the continuance of the arrangement for a further period of three years.

Finances and Official Relations
under the Temporary Arrangement
of 28th October 1909.

Continuation of the Temporary
Arrangement for three years.

In 1911 the demand in Burma continued to be quite satisfactory and all the money required for the mines was obtained from this source. In the London market an occasional demand arose but it was quite small and buyers expected constant price reductions.

Finances under Temporary Arrangement of 29th October 1908.

Year.		Royalties paid to Government.	Profits paid to Government.	Balance of Income and Expenditure Accounts.		Dividends paid to Shareholders.
				Profit. (4)	Loss. (5)	
(1)		(2)	(3)	(4)	(5)	(6)
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1910	...	9,461 17 4	...	1,015 13 9	...	...
1911	...	9,836 0 0	...	1,090 1 5	...	...
1912	...	12,069 6 8	2,378 18 2	7,635 16 4	...	7,475 0 0 = 6d. per share

Year.	Ruby Stocks.	Ruby Trading.
	£ s. d.	£ s. d.
1910	49,985 3 5	52,244 6 7
1911	56,809 18 6	57,568 14 6
1912	62,374 0 0	64,022 1 5

The only innovation which took place during this period was an attempt to mine the hillside deposits at Dataw about 2 miles north-east of Mogòk, that is to treat the detrital deposits of the slopes as distinct from the alluvials of the valley. A start was made in 1910, a small washing mill erected and a power line taken out. Water was laid on from one of the high level ditches and some thousands of tons of earth put through the mill but although numerous stones were obtained they were often rough, cracked and of a poor grade.

The following table shows the number of loads treated.—

		Trucks.		Cost per truck.
1909	...	1,074,166	...	7'9 pence
1910	...	1,594,993	...	6'7 "
1911	...	1,466,136	...	7'5 "
1912	...	1,479,845	...	7'5 "

Some difficulty had been experienced by large lumps of gravel and clay passing untouched through the screening cylinders of the washing mills and in 1910 a separate plant to treat these was devised and erected at the Tarakotan Mine.

Proposals to operate the Kathe Valley deposits, where a large area of ground known to bear both rubies and sapphires existed were held up at first for want of funds pending the decision of Government on the rent question. When this was remitted the draining and opening up operations were commenced and a mill erected, presumably the one from Dattaw, in 1912.

PART IV.—THE SUPPLEMENTARY AGREEMENT.

On the 17th January 1912 the shareholders were informed that the Secretary of State on the understanding that expenditure (now estimated at £20,000) would be incurred on the development of new areas had agreed that the existing debt should be remitted, but, in any year in which the net profits available for the Company (after paying royalties on rent and the Government's share of profits) exceeded £18,000, equal to 10 *per cent.* on the paid up capital, the Company would pay half the excess to Government until the amount so paid had reached the amount of debt remitted. The existing temporary terms under which actual royalty collections less 10 *per cent.* were paid to Government instead of rent, would be extended to the 28th February 1918.

This arrangement was embodied in a supplementary agreement, dated the 12th June 1912. The Directors proclaimed that they owed a debt of gratitude to the India Office authorities for the fair and generous way in which their demands were met and that they considered the settlement to be eminently fair and just from the shareholders' point of view.

In 1912 it was reported that the London sales were becoming smaller every year and the Chairman of the Board stated that he could not help thinking that the brokers of the Company, who had acted in that capacity for many years, did not suffuse sufficient energy into the sale of the stones. They had been met in every possible way and they ought to take more trouble and display more energy. The reductions in price as compared with the prices of five or six years previously ought to have induced fresh buyers but the results had been very disappointing. The principal shareholders and patrons were trying to repopularise rubies in the West End and he wished that every shareholders, each in his own sphere, would do his best to stimulate sales.

The Company blames its Brokers
for Poor Sales.

The synthesis of natural mineral products has occupied the attention of chemists for many years and ever since the year 1837 when Gaudin made a few tiny flakes of artificial corundum, French experimenters have in particular carried on researches in the manufacture of the ruby. Fremy and Feil, as early as 1877, succeeded in producing small rubies.

The Competition of Artificial and
Reconstructed Stones.

Reconstructed rubies made by fusing fragments of the natural gems in the oxy-hydrogen flame appeared on the market in 1885, though as a matter of fact, it was usually a simple enough matter to distinguish their true origin. It is indeed doubtful if the presence of these stones on the market interfered at all with the sale of the Burma stones.

In 1904 however, Verneuil, who was a pupil of Fremy's, invented the inverted blowpipe which enabled him to master the difficulties which had baffled his predecessors "and to manufacture rubies vying in appearance after cutting with the best of nature's productions."

The process, which need not be described here, is so simple, that one man can attend to a dozen or more machines, and it takes only one hour to grow a drop large enough to be cut into a ten-carat stone.

"The cut stone", writes Herbert Smith, an expert of the British Museum, "has not only the density and hardness but also all the optical characters—refractivity, double refraction, dichroism, etc.—pertaining to the natural species, and will obey precisely the same tests with the refractometer and the dichroscope. Were it not for certain imperfections it would be impossible to distinguish between the stones formed in nature's vast workshop and those produced within the confines of a laboratory." At the same time and especially of later years as the technique of the process has advanced it is no simple matter for an untrained observer to distinguish the better varieties of the artificial ruby from the natural stones.

To quote Herbert Smith again:—

"at the time the manufactured ruby was a novelty, it fetched as much as £6 a carat, but as soon as it was discovered that it could easily be differentiated from the natural stone, a collapse took place, and the price fell abruptly to 30 shillings, and eventually to 5 shillings and even 1 shilling a carat. The extreme disparity at present obtaining between the prices of the artificial and the natural ruby renders the fraudulent substitution of the one for the other a great temptation."

It is quite true to assert, as Sir Lepel Griffin once did, that there will always be a large clientele who would not buy an artificial stone even if it could not be distinguished from a real one. These are the wealthy who have the funds to purchase the real and the best and the knowledge to understand where it is to be obtained. It is of little value to warn, even if it were possible to do so, the purchaser in the eastern market to beware where and from whom he buys or to be particularly suspicious of apparently remarkable bargains. For a time the Directors of the Ruby Mines Company seem to have deliberately closed their eyes to the inroads of the artificial stone on their preserve, but they were forced to consider them in the end. In 1910 Sir Carl Meyer, attempting to give reasons for the slump, stated that there was no reasons to suppose that the ruby had gone out of fashion, or that the wrong which it was thought at one time was being done to the genuine stone by the spurious article had operated or still operated against their sales. Sir Carl, however, had modified these views only a year later when he said that though he did not consider the fall in the price of rubies was due mainly to the artificial or the

reconstituted rubies, yet at the same time he thought it would be foolish to deny that part of the fall in price might be due to that cause.

In 1912 the Board frankly admitted that the continued depression of the London market was due to a certain extent to the existence of the artificial stones and to the advertisement that they had received in the Press from time to time. With the aid of expert advice, instruction charts were prepared and circulated to jewellers and others all over the world, instructing them in the discrimination of genuine and manufactured stones.

It is perhaps in the eastern market where this competition has been most keenly felt, for it is no secret that some thousands of carats of manufactured rubies are shipped annually to the east and are to be bought in quantities in Colombo, Singapore, Calcutta, Madras, Rangoon and Mandalay.

Having obtained a settlement with Government in 1912, the affairs of the Company looked better in 1912 and 1913 than they had done for some years previously. A small dividend of 6*d.* per share was paid in 1912 and again in 1913 of the same amount. The London market continued very quiet but the sales at the mines in 1913 exceeded those of any previous year.

The next year (1914) saw a great change for the worse with a loss of over £9,000 on the year's working. Low returns from the Mogôk mines caused anxiety; on the other hand, the Kathe Mine, opened up in 1912 under the agreement with Government, was steadily improving. The sales in Europe were only 6 *per cent.* of the total sales—the lowest on record. The actual quantity of stones mined showed no falling off but owing to the scarcity of fine gems, the average value decreased. Bank failures in India almost halved the local sales and receipts in Burma no longer paid working expenses. The continued appearance of parcels of artificial rubies in Indian bazaars was also a very disturbing factor. In some instances parcels of stones were sold at less than half the invoiced price to raise funds. The Company was in an exceedingly critical position.

In these circumstances the Board authorised the agent to retain temporarily the royalties collected for Government and the whole position was put fully before the Secretary of State. In September 1914 the Secretary of State agreed, in view of the special difficulties caused by the war to suspend the recovery of the amount (£8,799-12-0) due by the Company in respect of royalties received from February 1st to August 31st, 1914, until the termination of the war on condition that the working of the mines should be continued.

From the start of the war the European demand stopped completely and it was necessary for the Company to depend entirely on the local market.

The years 1915, 1916 and 1917 all showed losses. The state of the native mining industry is witnessed by the royalties, which fell from £23,000 in 1914 to £4,000 in 1916, rising again to £8,000 in 1917. Most of the European staff left to join the forces. All salaries in London and Burma were reduced by 25 *per cent.* from October 1914. An attempt to lower coolie wages from 12 to 10 annas a day resulted in many of the best men going to the Bawdwin Mines, so it was abandoned.

In October 1914 a local agency for the sale of stones was opened in Madras, as the Company had relied on the Madras market for some time to keep going.

The native market continued good in 1915 and 1916 and in 1917 local sales were restored to their former level as the mines were again paying their way through local sales. The war entirely stopped the manufacture of artificial rubies which the Board now recognised as having seriously competed with the real article and which, had, no doubt, been the principal cause of the severe fall in price previously.

It was now beginning to dawn upon the company that there was only a very limited area of ground left at Mogôk and that it was necessary to search further afield for new areas.

In 1918 the sum of £8,799 outstandings due to Government was paid up, while for 1919 a profit of over £30,000 on the income and expenditure account enabled the payment of a small dividend of 6d. per share. This favourable condition of affairs however is somewhat illusory as it was due mainly to the finding of one large stone, the Peace Ruby which was sold on the spot for 3 lakhs of rupees.

The following table gives the main financial results for the years 1913 to 1920 :—

Year.	Royalties to Government.	Profits to Government.	Balance of Company's Income and Expenditure Account.		Dividends to Shareholders.
			Profit.	Loss.	
(1)	(2)	(3)	(4)	(5)	(6)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1913	13,350 16 0	2,818 9 1	8,159 6 7	...	7,475 0 0
1914	23,054 13 4	...	...	9,065 10 1	...
1915	9,117 6 8	...	...	11,780 11 3	...
1916	4,152 0 0	...	...	511 3 4	...
1917	8,204 8 0	...	...	329 12 2	...
1918	14,276 0 0	1,080 5 0	3,600 16 8	...	...
1919	16,878 13 4	...	...	562 8 11	...
1920	27,160 0 0	11,421 13 2	30,572 3 9	...	7,475 0 0

Year.	Ruby Stocks.	Ruby Trading Account Balance.
	£ s. d.	£ s. d.
1913	61,345 11 7	63,896 14 11
1914	58,933 9 2	43,891 6 8
1915	56,258 5 8	36,076 10 1
1916	57,001 12 6	38,192 17 1
1917	49,511 19 9	41,511 19 9
1918	...	...
1919	38,121 14 6	45,919 8 11
1920	29,625 17 11	83,030 2 6

For a proper appreciation of the causes which have led to the virtual extinction of gem mining by Europeans in the Mogòk Stone Tract, it is necessary to consider the technical position during the period 1913—1920 in greater detail than has been the case earlier.

In 1913 the washing mills at Shwebontha and Redhill were supplied from the Central Mines. The plant at the former, which had worked from the spring of 1895, was difficult to feed as the rock bottom had been reached in the lower levels of the western half of the Central Mine, on the south-east and west the boundaries had reached streams while barren ground existed on the other side. In October 1913, it proved impossible to operate the mill any longer at a profit and it was dismantled. Up to that time in 1913, it had treated 231,166 trucks for a return of Rs. 1,31,900.

The Redhill washer was supplied from the south-east of the valley and during the year treated 349,803 loads for Rs. 1,81,135. The value was lower than usual because the stones were rougher and inferior. During the next year (1914), 318,943 loads gave gems to the value of Rs. 1,86,876. By 1918 it was becoming more difficult to keep this and the other washers going and the only untouched ground left in the Central Mines consisted of a narrow strip carrying the Government cart road and the Ywale stream, both of which would have to be diverted and arrangements made to keep the tailings away from the drainage tunnel before it could be worked. In 1918 the Redhill washer treated 236,774 loads and returned Rs. 1,13,557, most of which came from previously unworked ground under the original ramp. In 1920 working day shift only 172,442 loads were treated for Rs. 1,34,948 including Rs. 24,000 from a new method of sluicing adopted about that time. At attempt to open up a

face towards the Shwegu Pagoda this was defeated by landslips but a winder was erected to work out the pot holes in the rocky floor. The next year's working (1921) showed 180,093 trucks for Rs. 1,16,394, and it was apparent that the inevitable end was in sight.

At the Padansho Mine, higher up the main valley, the ruby-bearing earth lies at a shallower depth than in the Central Mines and in 1913 the working faces were very near the boundaries. It was decided to tap a new area on the south-east, on the eastern side of the river and near the Momeik road. A tunnel, 250 feet long, was driven under these for this purpose. Prospecting pits had given fair indications in this area which was known as Laybinzin and in addition, it had yielded valuable stones to the native miners, but Padansho was finally shut down in June 1914 as the ground proved to be unprofitable for the methods adopted. In its last year its washer treated 244,463 trucks for a return of Rs. 1,50,322.

The Taroktan Mill at the south end of the valley was being supplied from the old Polo Ground in 1913. The main area was then exhausted and nothing remain but a few pockets and cracks in the rock. The *byon* laid shallower here than in the main mine and the rubies were smaller. In 1913 the Taroktan Mill treated 298,163 loads for a return of Rs. 2,27,869. The 1914 returns were 302,544 loads for Rs. 1,64,962, the material again coming from the old Polo Ground. By 1918 the output of this mill had fallen to 149,421 loads of a value of Rs. 1,78,530. The method of working was very slow and costly, the *byon* patches in the pot holes and "backs" being opened up by blasting and the materials carried by trucks, hand shunted to the nearest ropeway. In 1919, 151,163 loads were treated for a recovery of Rs. 4,82,385 but included in this is the famous "Peace Ruby" which brought Rs. 3 lakhs. This was a superfine stone of beautiful colour, almost free from silk or inclusions and weighing 42 carats. Except for a fracture, which would take away a thin slice of about 8 carats, it was faultless and of a good shape for cutting. [This stone was brought by one Chote Lal, a dealer in Mogôk, cut in England and is said to be still (1927) in Paris awaiting a purchaser.] A sluicing plant was erected at Taroktan in 1919 which in 1920 ran for 2,484 hours at a cost of Rs. 20,342 and produced stones of a value of Rs. 50,520. The ordinary washing plant treated 171,788 loads for a recovery of Rs. 1,44,070.

Kathe.—The drainage tunnels and cuttings were finished in June 1913 but were damaged by floods and not opened until January 1914. The washer was the old Chaungzone plant, greatly improved, a modern sorting compound was added with ample screening, pulsating and lump washing plant. Power was brought from Mogôk over a line more than 5 miles long. By the end of 1914 four acres of ground had been worked out. The average yield of gems was higher in quantity but somewhat rougher in quality than the Mogôk stones. Three lakhs eighty-nine thousand seven hundred and ninety-eight trucks were washed for a return of Rs. 2,22,066. In 1916 a second washer was erected at Saza-in near Kathe which in 1918 treated 196,680 loads for a return of Rs. 1,46,840 or more than treble the value of the previous year. Kathe only gave Rs. 2,04,240 as a result of treating 320,885 loads. The small Kyaundwin Valley, interesting as the only area where the Company still continues scientific mining operations to-day (1927), was just beginning to be tapped at this time. It now contains a narrow but rich seam of *byon* near a contact of limestone with biotite schists but has the misfortune to be overlain by 60 to 70 feet of more or less barren overburden.

The Saza-in mine was closed down in May 1919 owing to labour troubles which also upset operations at Kathe to some extent. The opening up of the Kyaundwin are continued and it was found to contain two seams of *byon* at different levels, one being composed of sand and gravel a few feet in thickness and some 30 feet below the surface and the other of *semai*, a clay-like variety of *byon*, 70 feet below the surface in contact with the limestone.

In 1919 the Kathe washer treated 381,127 loads for a return of Rs. 3,27,430. In June, a sapphire weighing 200 carats was found, a showy stone of a deep rich colour, spoilt however by yellowish patches and rather too much "silk." It was sold for Rs. 40,000. Soon afterwards another 46 carat stone brought

Rs. 20,000, followed by a third for Rs. 11,000. In the following February a bright and clear specimen came to light, which was valued at Rs. 15,000. Other places were explored in the Kathe mines where the *byon* was often 10 or 12 feet thick but these yielded much "*souzi*" and "*hmatsa*" rough and impure stuff and very little gem corundum.

The following year (1920) the Kathe washer treated 406,000 loads for a return of Rs. 2,73,560 but this included some ground from the Dautagataung mine.

Dautagataung.—In May 1919 there was a rush of native miners to Dautagataung (327 licenses being taken out in that month alone), which led to some trouble between them and the Company. However, the Company started to develop in that direction the same year, installing hydraulic sluicing plant to supplement the Kathe output without much increase of the labour force. A test pit sunk close to the northern boundary of the Company's land showed the *byon* to lie about 50 feet deep and top strippers were put on to clear a place for the plant. The rest of the story need not be told. Ninety thousands truck loads were washed without the recovery of a single gem and the experiment closed in 1920.

Pama.—After the Dautagataung failure, it was decided to run the Saza-in plant again, but to feed it from the Pama fields (returning thus to the scenes of the Company's earlier failures). Test pits are said to have proved the existence of a thick seam of *semai byon* within 25 feet of the surface extending down to bed rock at 40 feet. These operations failed too and were stopped soon afterwards.

Enjouk.—In 1920, the Enjouk sluicing project was put into operation, the engineer in charge at the time stating "it is a scheme to start something apart from the main Mogòk Valley, which has recently been so poor. The constant fear of increased expenditure has somewhat hampered development work in recent years (!), but a time comes when one absolutely must open up new places."

The Enjouk Valley is a small one entering the main Mogòk Valley just behind Pooyah-taung. It had been extensively mined in the past by native methods and could not be expected to do more than supply a small portion of the Company's requirements in *byon*. It produced the Enjouk ruby in 1922, a stone of 23 carats, but otherwise does not appear to have yielded stones of any particular value.

Bernardmyo.—This is a valley 11 miles north of Mogòk which has long been known to yield sapphires. The rise in the value of these blue gems attracted the attention of the native miners. Several valuable stones were found there in 1912 and 1913 and the usual rush started. The Company bought up ground in the valley and erected a prospecting mill driven by a Pelton wheel connected by a wire rope transmission. The undertaking was a failure and the mill was closed down in 1914.

It cannot be denied that about this time work was being presented with energy on those areas which the Company had opened up, *i.e.*, around Mogòk and Kathe. It is also evident that operations were becoming unprofitable. The following table shows how the output of *byon* diminished while costs increased :—

Approaching Exhaustion of Mogòk Valley Deposits.

		Loads washed.		Cost per load.
1913	...	1,383,146	...	7'77 pence.
1914	...	1,148,155	...	9'09 "
1915	...	1,081,093	...	6'4 "
1916	...	1,181,023	...	6'68 "
1917	...	969,959	...	8'9 "
1918	...	903,760	...	10'4 "
1919	...	754,324	...	14'22 "
1920	...	903,760	...	10'4 "

Values too were going down and although there was always the chance of the occasional discovery of large gems. Coupled with the continued fall in the price of rubies was the unpleasant fact that the central portions of the Mogòk

deposit were about exhausted. The sides of the valley deposits did not contain either so many or such valuable stones as the middle part had done. The value per truck was slowly approaching that of the working cost. To a mining engineer two courses were open (a) to devise a system of working by which costs could be substantially reduced in order that the valley side deposits of Mogòk could be worked at a profit, *i.e.*, those portions where the hillside detritus joins the true water sorted alluvium, or (b) to open up fresh valley deposits elsewhere in the great expanse of territory leased to the Company.

The developments at Kathe and other places near it were the reply to the second item while the possibility of applying the first was pointed out by A. H. Morgan before he left the Company's service for war work. He

Proposal to Hydraulic
Khabine Valley.

drew the attention of the Board to the fact that the Khabine Valley had produced larger and more valuable sapphires than any other place. One stone found by a native miner there possessed the enormous weight of 3,000 carats (surely the most gigantic one ever reported) which was sold for Rs. 96,000. Gem-bearing gravel is found here on the slopes of a large hill and in the small Khabine Valley close by. "It is doubtful," he wrote "if the Khabine Valley could be worked at a profit by our system of hand excavation, but there is the alternative method of hydraulic as the area is much lower than the surrounding country, it may be possible to lay on a sufficiently high pressure water supply to break down and clean the ground in the rainy season so that it can be sorted during the remainder of the year. The project deserves consideration when time and circumstances permit."

What consideration did the scheme receive? Rance who followed Morgan as Chief Engineer reserved some fields for mining in 1919 "because it was time to make preparations for extending our operations further afield." He also undertook preliminary surveys in connection with a water power scheme. He found it possible to make a ditch from Gwebin at a small cost to carry part of that stream to a point on the hills above Khabine where the pipe line would commence and deliver pressure water to the mine below. The year following he obtained the permission of Government to construct the water channel but until pipes could be bought at a reasonable cost, it must remain in abeyance. "In the belief that our future lies in mobile sluicing plants we have been steadily acquiring areas or having them reserved, so that we may in some cases have material to work on that the native miners have not already been through."

This idea was probably at the back of Mr. Rance's mind when he had a plan made of the Kin Valley, 25 miles west of Mogòk in 1919. He also proved that the Kin river might eventually be an important source of power.

There these matters rested. It is a mystery to me why the Burma Ruby Mines, Limited, have never attempted large scale hydraulic methods for the treatment of the hillside deposits. It is a very much cheaper method

Hydraulic vs
Hand Mining.

than the slow, laborious and costly process of digging out the gravel by hand and then hauling it to washing machines. Barrington Brown suggested such methods in 1888 but the early ex-Colonels who were in charge at the commencement did not consider it suitable. That they were not qualified to judge is proved by the fiascos 54 which followed the prosecution of their own ideas. It can only be put down to the conservatism of a non-technical directorate, which hesitated at the cost of a few strings of pipe in 1920.

Stirred out of their lethargy by the ever-increasing costs of an antiquated man-handled system of work, they permitted Rance to experiment with a modified form of hydraulic-sludging in 1920. The washing mills and pulsators which were previously used were efficient and up-to-date plants designed on the lines of those used in the South African diamond fields. But the diamonds of South Africa occur under totally different geological conditions from the rubies of Mogòk, and a ton of diamond-bearing ground is said to be worth 6 shillings or over, while the ruby-bearing material may be worth anything from 8 to 12 annas per ton. Clearly some cheaper method is indicated. The upkeep of these washing

Modified Sluicing adopted in 1920.

units is costly and the expenditure involved at post-war prices in steel plates, trucks, rails, ropes, etc., besides gangs of drillers, oilers, drivers and actual miners, to say nothing of skilled artisans in the shops, reached a point when, in spite of the most rigid supervision and economy in stores, and labour, the remaining ground at Mogôk barely paid for treatment.

Rance's system was to break down the working face with monitor jets under moderate pressure, the water being obtained from the existing ditches above the valley. The material was then raised by means of hydraulic elevators to the top of the sluicing arrangements proper. This plant consisted of a vertical wooden frame about 18 feet in height and 9 feet square, built over the first bay of the sluice and fitted with screens to remove large rocks and stones. The screens passed on their oversized stuff to extension tables where it was hosed clean and sorted.

The rest of the undersized gravel up to $\frac{7}{8}$ inch diameter passed through further screens and then entered the sluice boxes. At first the familiar rifled boxes used for recovering gold and tin stone, were tried and found useless as they either packed solid or washed out clean. A series of boxes was then installed, each of which was fitted with rows of 2-inch pipes at the bottoms and sides, drilled with numerous small holes to allow rising streams of water under a regulated pressure to pass through the gravel and assist in its concentration. The results were very good and rubies, the size of a grain of sand, were recovered as well as the larger ones. The labour required was one sluice man and one European sorter per day.

The figures taken from the official accounts for the year 1920-21 showed that Rs. 5,31,493 spent on the washing mills realised Rs. 5,34,026. By the sluicing method just described Rs. 26,236 were expended for a return of Rs. 1,07,140 for the seven months that the sluices were in operation.

"There is no doubt," wrote Rance, "that we have now a sure and certain method of testing our deposits at about one-quarter the cost of the washers fed by rope haulage, by very simple efficient machine without any moving parts, which collects a concentrate similar to that of the rotary pans of the washing mills." He added that the method could not be extended until money was available for pipes, water channels and additional power plant.

The hand-to-mouth system of finance adopted by the Board prevented these funds from being forthcoming and the system was never used on the extensive scale that it ought to have been to ensure success.

The dividend of 1920 of 6d. per share was the last that the Company paid and losses have been registered every year since then as the following table shows :—

Year.	Royalties.	Profits to Government.	Company's		Dividends.
			Profit.	Loss.	
(1)	(2)	(3)	(4)	(5)	(6)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1920 ...	27,160 0 0	11,421 13 0	30,572 3 9	...	7,475 0 0
1921 ...	14,528 0 0	Nil.	Nil.	5,929 13 4	Nil.
1922 ...	9,240 10 8	Nil.	Nil.	2,639 2 11	Nil.
1923 ...	11,279 17 4	Nil.	Nil.	5,707 13 8	Nil.
1924 ...	10,368 16 0	Nil.	Nil.	4,798 3 3	Nil.
1925 ...	6,229 6 8	Nil.	Nil.	33,519 17 4	Nil.

Year.	Trucks mined.	Stones mined.	Stones sold.	Stock stones.	Ruby Trading Account (Balance).
(1)	(7)	(8)	(9)	(10)	(11)
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
1920 ...	754,324	76,133 0 0	91,601 0 0	...	...
1921 ...	771,406	43,010 0 0	33,507 14 9	42,555 9 10	46,395 14 9
1922 ...	748,242	49,372 0 0	45,372 7 10	47,468 2 4	2,254 0 9
1923 ...	770,815	48,778 0 0	40,972 5 5	54,853 1 3	48,206 18 3
1924 ...	859,142	53,747 0 0	47,842 6 11	57,847 0 10	50,704 3 3
1925 ...	628,842	24,087 0 0	38,488 0 9	38,026 5 7	18,521 2 10

In 1922 the Board officially recognised that the Mogôk Valley mines were nearing the end, the sluices added little to the output as they were idle most of the time for want of water. This is a strange confession from for a so-called Mining Company for funds should have been provided to enable the engineers to supply the water. The crash came in 1925, owing to the loss of over £35,000, "due to unforeseen difficulties and the panning out of two mines in Mogôk." On November 20th of that year the shareholders at an extraordinary general meeting decided unanimously to go into voluntary liquidation and distribute the remaining assets amongst themselves.

It is necessary, however, to describe the belated and unsuccessful efforts of the Board to retrieve the situation. In addition to the losses shown in the table, the period started with a liability of £19,589-7-9 to Government of arrears, the payment of which could not, in the opinion of the Board, be enforced until in any year the net profits available for the Company (after paying royalties and Government's share of the profits) exceed £18,000 (under the 1912 understanding). On June 18th the Board addressed the Secretary of State and requested :—

(a) that the arrangement of 1912, whereby in lieu of the rent of 2 lakhs of rupees per annum [fixed by the second lease (1904)], the Company pays the royalties actually collected less ten *per cent*, should be extended from 28th February 1925 to the expiry of the lease in 1932. (This request had been made earlier on two occasions, *viz.*, 14th November 1916 and 12th June 1917);

(b) that in view of the urgent need for active prospecting if the Company was to hold its own, the arrears of £19,589-7-9 may be entirely remitted on the understanding that every effort is made to develop a new area.

Arrears of Due for Rent in 1907 and 1918.

(In September 1923, A. S. Wheeler had been appointed Chief Engineer and had submitted certain technical reports relating to future extensions.) "No. mining proposition" stated the Chairman (Sir H. S. Barnes, K.C.S.I.) at the 36th meeting of the Company "can hope to carry on without steady expenditure on development. This Company has been seriously handicapped in this direction by want of funds, owing largely to the mistaken views formed by the Government and the original promoters as to the proceeds of the royalties and the productivity of the mines, and also, I venture to think, by the constant reluctance of the Government to modify in time, terms which experience has shown to be incapable of fulfilment."

On the 29th January 1925, the Company was informed that the Secretary of State was prepared to assent to both these requests on the understanding that the remission of the Company's contingent liability of £19,589-7-9 would be subject to an undertaking by it, to spend an equivalent sum on developing new areas of ruby-bearing ground on the western slopes between Bernardmyo and Kathe within the period 18th June 1924 to March 1927.

The Company accepted this condition and its terms were embodied in an Indenture, dated the 14th of May 1925. So much of the liability as is equal to the amount expended annually was to be absolutely released and written off, but clause 4 stated further that if at the end of the period any part of the sum shall not have been written off it shall be recoverable under clause 2 of the 1912 agreement. The Secretary of State, however, had been advised that he was not entitled under the first Supplementary Agreement to recover the sum except out of profits, *i.e.*, the Company's share of net profits, and accordingly he could not "prove" for this sum in the event of liquidation (No. E and O. 525-25, dated the 4th February 1925).

The Indenture of 1925.

In the meantime the mining business was rapidly going from bad to worse. The Mogôk Valley was worked out. Enjouk and Kathe gave rapidly diminishing returns. The Agent in Mogôk could no longer meet current expenses as he had done in the past and remittances had to be sent to him—the proceeds of the sale of the Company's investments. These were valued at £32,439 in February 1924, at £20,087 in February 1925. The general trade depression made it difficult to sell gem stones. Stocks had to be revalued at a lower figure. The usual appropriations, amounting to £5,800 were made for depreciation, and

the Company's year closed with an adverse balance of £33,519-7-4. The Sinkwa developments undertaken under the terms of the 3rd Indenture proved a failure after £4,627-5-6 had been spent on them. Quantities of poor rubies were found but none of any real value.

No funds remained to carry out the Secretary of State's condition that the western slopes should be opened up. To do this adequately fresh capital was necessary. A secured debenture loan was essential for this and as the Company possessed no sufficient security likely to satisfy the market for this, an amazing proposal was made that the service of the debentures should be guaranteed on the proceeds of the royalty collections, which was tantamount to making the native miners responsible for the future extension of the Company's operations.

The detailed scheme, as laid before the Secretary of State of June 5th, 1925, was that £50,000 new capital should be raised in 8 *per cent.* debentures to be redeemed by a sinking fund of 2 *per cent.* per annum. Realising the impossibility of raising these funds without showing a reliable source of revenue from which they could be met, it was proposed that Government should cancel the existing lease and grant a new one for 21 years (to enable the debentures to be redeemed by the sinking fund), and to so modify its dues that Government should receive half the net annual profits of the Company in place of the actual royalties (less ten *per cent.*) collected and 30 *per cent.* of the profits. Government was thus to receive no rent. The Company's debentures were to be served by the fees of the native licensees and all that was offered Government was a problematical 50 *per cent.* of the profits.

On the 2nd September 1925 the Company was informed that the Government of India after consulting the Government of Burma had informed the Secretary of State that they were unable to consider the proposal. They saw no justification for extending the Company's lease or for permitting them to appropriate the royalties from the Burmese miners. They recommended, however, that the Company should be allowed to continue working on its present basis for the unexpired period of the lease, on the understanding that their liability of £19,589-7-9 was cancelled unconditionally. The Secretary of State concurred in these views.

Meanwhile the assets of the Company were dwindling away and by November 20th when it was decided to go into Voluntary Liquidation in 1925. liquidation the investments of the Company stood at £6,500, stones in stock in London were worth about £4,000 and in Burma about £23,000 with outstandings there of some £10,000.

Beyond the fact that the mines were offered for sale in September 1926 for 8 lakhs of rupees (subject to the approval of the Government of India), I do know, what, if any progress has been made with the liquidation.

By the rigorous cutting down of expenses and by letting out certain areas previously in the sole possession of the Company to native miners on a half-and-half-share tribute system, coupled with good finds of sapphires in the Kyaungdwin Mine (the only one still working by European methods) it has proved not only possible to pay the way of the skeleton organization still remaining at Mogök but also to remit to London some Rs. 2,01,460 in 1926.

It is understood that a meeting is to be held in London in January 1927, on which the future of the concern will depend,

APPENDIX I.

REPORT ON THE WORKING OF THE MINES FROM 7TH DECEMBER 1925 TO THE
7TH DECEMBER 1926.

(1) Expenses—

				Rs.	A.	P.
Cost of Coolies	...	...	...	56,872	6	0
Native Pay	...	...	...	61,149	5	0
European Pay and Allowance	...	...	...	63,593	2	0
Miscellaneous Expenses	...	...	...	79,205	0	11
Remittances to London Office	...	...	...	2,01,460	4	11
Total	...	...	...	4,62,280	2	10

The details of which are as follows :—

Cost of Running.

				Rs.	A.	P.
Administration	...	...	...	11,108	1	0
Office and Accounts	...	...	...	8,109	8	0
Stationery, Postages, etc.	...	...	...	1,137	7	0
Medical Expenses	...	...	...	2,599	7	0
License Inspectors	...	...	...	10,694	5	0
Agency Fees	...	...	...	1,200	0	0
Miscellaneous	...	...	...	8,456	15	0
Travelling Expenses	...	...	...	1,278	0	0
Superintendence	...	...	...	12,842	5	0
Madras Agency	...	...	...	2,702	0	0
Vellore Agency	...	...	...	1,398	0	0
Power Station	...	...	...	32,540	10	0
Mines	...	...	...	1,15,083	1	0
Tribute Supervision—22,821-7-0, Paid for Stones	28,121-8-0=			50,942	15	0
Development	...	...	...	727	3	0
Remittances to London Office	...	...	...	2,01,460	4	10
Total	...	...	...	4,62,280	2	10

If we deduct the amount Rs. 2,01,460-4-11 remitted to London, it leaves us with Rs. 2,60,819-13-11 as the net working expenses in Burma.

(2) Our Cash Receipts were as follows :—

				Rs.	A.	P.
Interest	...	...	...	235	6	0
Outside Jobs	...	...	...	82	4	0
Royalties (Collection <i>per cent</i> on)	...	...	...	6,720	0	0
S/Drs. for Sales Cash Collections	...	...	...	4,62,501	10	6
Sundry Receipts	...	...	...	1,349	2	0
				4,70,888	6	6
Cash Receipts during the year	...	...	...	4,70,888	6	6
Working Expenses during the year	...	...	...	2,60,819	13	11
Balance	...	...	...	2,10,068	8	7

To this we must add the present estimated value Rs. 47,350-6-0 of stones mined during the period under review, but carried to stock and still unsold.

Also the value Rs. 37,508-2-0 of stones sold since 7th December 1925 but not paid for on 7th December 1926 :—

	Rs.	A.	P.
	2,10,068	8	7
	47,350	6	0
	37,508	2	0
Total	2,94,927	0	7

The actual excess of revenue from all sources over actual working expenses in Burma, is therefore Rs. 2,94,927-0-7 of which Rs. 2,01,460-4-11 have been remitted to the London Office.

(3) *Tributors.*—This method of working shows a profit of Rs. 59,753-1-0 for the year.
The details are—

				Rs.	A.	P.
Expenses.—						
Cost of Supervision	...	...	...	22,821	7	0
Amount paid for stones received and taken into stock	...	...	...	28,121	8	0
Total	...	...	...	50,942	15	0
Receipts.—						
Value of stones sold from stones mined at full value	...	...	...	56,243	0	0
Value of the stones sold to <i>Tributors</i> and cash received	...	...	...	54,453	0	0
Total	...	...	...	1,10,696	0	0

Such good results are not anticipated now owing to the restricted area of working, but one or two good stones might make a great deal of difference. The Mogôk Valley Drainage Tunnel being blocked the mines in Mogôk are now a series of lakes. Tribute work is however being still carried out on the banks above water and at the north-west of the mines which are not flooded. Also at Kathe.

(4) *License Inspectors*.—The cost of working this department was Rs. 10,694-5-0, while the income received by *per cent* on collections was Rs. 6,720. There is, therefore, a loss of Rs. 3,974-5-0. We collected and paid to Government for royalties Rs. 67,200 and received Rs. 6,720 back as our commission.

(5) *Production*.—The actual production (stones mined) for the year from the various mines was as follows :—

					Rs.	A.	P.
Kyaungdwin	...	...	...	...	2,97,482	2	0
Tribute	...	...	...	...	1,10,696	0	0
Enjouk	...	...	...	...	13,950	0	0
Kathe	...	...	...	...	1,328	8	0
Myaws	...	...	...	...	5,432	0	0
Total	...	...	...	...	4,28,888	10	0

Kyaungdwin Mine is the finest sapphire mine in the world, but the deposit lies in very deep pockets, with a very large quantity of useless overburden. It is being worked very efficiently and cheaply by means of gravel pumps and a sluice and is now enjoying a phenomenal output.

There are several more pockets, which are expected to be equally as good as those in view, yet to be reached and cleared out. There is a large area of ground as yet untouched, and it is impossible at present to forecast what its contents might be. However, there is no reason to anticipate any falling off in output.

(6) *Stock of Stones*.—On the 7th December 1925, we had in stock in Mogôk stones to the value of Rs. 3,50,983-6-3.

During the year we added to that stock by cancelling sales, returns from London, etc. stones to the value of Rs. 29,409-14-0.

We have consigned to Messrs. Triefus or the London Office stones to the value of Rs. 30,601-4-0 mostly still unsold, and have sold from that stock stones to the value of Rs. 60,237-14-0.

Leaving a balance in hand after re-sorting certain grades, and making a reduction in valuation of Rs. 2,23,961-11-0. During the year we have mined and added to that stock unsold stones to the value of Rs. 47,350-6-0, leaving a balance of stock on hand valued at Rs. 2,71,243-15-0. Detailed sheets are attached for your information.

(7) *General Situation*.—We started in Burma on the 7th December 1925, with the following liquid assets :—

					Rs.	A.	P.
Cash in hand and Banks	...	...	...	...	26,178	0	9
Stock of stones valued at	...	...	...	...	3,50,983	6	3
Outstandings	...	...	...	...	1,37,454	10	0
Total	...	...	...	...	5,14,616	1	0

We finished the year with the following—

					Rs.	A.	P.
Cash in hand and Banks	...	...	...	...	36,277	3	0
Stock of Stones valued at	...	...	...	...	2,71,243	15	0
Outstandings	...	...	...	...	93,490	10	6
Total	...	...	...	...	4,01,011	12	6

The value of the stock of stones has been reduced by re-sorting and re-valuation to some extent, and the amount of the outstandings by cancelling certain sales and returning the stones to stock.

What it amounts to is that after the year's working, paying all expenses, and remitting Rs. 2,01,460-4-11 to the London Office our position is a remarkably good one as we have no liabilities to meet.

We have a splendid asset in Kyaungdwin Mine fully developed which might produce anything.

The concession is by no means worked out. In fact, there are large areas yet untouched by us which present great possibilities.

J. F. HALFORD-WATKINS,
for Agent.

Mogôk, 16th December 1926.

APPENDIX II.

NOTES ON NATIVE MINING (PRESENT AND FUTURE) AND THE OPERATION OF THE RULES FOR THE MOGÔK STONE TRACT.

Rules 6 to 9 and Rule 31 deal with *extraordinary* licenses, which permit the holder to mine by any method as distinct from an *ordinary* license which limits the holder to native methods and prohibits the use of explosives or machinery. Rule 7 authorises the Subdivisional Officer to grant

extraordinary licenses to any person with the previous sanction of the Governor. Clause 2 (3) however of the current lease (1904) grants the *sole and exclusive* right to an extraordinary license to the Company except in areas reserved for native *lu* and *hmyawdwins*. Rule 12 authorises the Subdivisional Officer to grant ordinary licenses to any *hereditary miner*. The Company's rights are fully safeguarded by Rules 14 to 16. Rule 21 authorises the Company to grant ordinary licenses to *any person* though I understand that they are only issued to those applicants whose names appear on the list of hereditary miners. In practice, the Company *alone* issues the licenses, monthly, and under a custom, the origin of which is unknown the smallest number of workmen for whom a license is granted is three.

I see no particular reason why mining should be restricted to an hereditary class, especially as it is widely admitted in Mogôk that the hereditary miners are in the habit of lending their names (for a small consideration) to any one desirous of taking out a license. If the Company ceases to exist mining should in my opinion be made free.

There is a complete lack of contact between the local authorities and the Company in the matter of licenses and technical questions. The Subdivisional Officer has no record of the number of licenses issued or to whom they have been granted. I was unable to obtain from him a list of the areas within the township where native mining is prosecuted, or of the amount of revenue coming in, or any information about the general state of the native industry. Neither the Subdivisional Officer nor the Deputy Commissioner in Katha have copies of the excellent large scale maps of the Stone Tract which although old are of great value. Again my application for a list of the areas specially reserved by Government for the convenience and exclusive operation of the Company, was sent by the Deputy Commissioner to the Company to supply. I wish it to be distinctly understood that I am bringing no charges against the local authorities who have helped me in every way to the full extent of their powers, nor, on the other hand, against the few remaining officers of the Company who have supplied me courteously with all the information I asked for. The local authorities are the heirs of an ancient system which regarded the Company as a separate administration operating in an *enclave* of its own. This absence of *liaison* is to be deplored for it has left Government, on the verge of the Company's extinction with a complete absence of those technical records which are essential to a complete understanding of the present position, should Government have to undertake the control and development of the indigenous industry in the near future. Even at this late hour, I suggest that the Subdivisional Officer in Mogôk should be supplied month by month with a list of licenses issued by the Company, of the fees received, of the situation and extent of each area given out.

It is also essential that before the Company finally expires Government should be supplied with similar data for the past, with copies of all maps, plans and sections and all technical records in the possession of the Company bearing on its own, or, on the indigenous system as distinct from the commercial accounts, audit reports, etc., already on record.

I have inspected various native mines in and about Mogôk,—*twins*; *lus* and *hmyawdwins*. I think it is hard in these days that they should be deprived of the use of simple mechanical contrivances if they wish to maintain them. For example, much time is wasted in bailing out shafts and holes full of water, especially about the edges of the side valleys of the main Mogôk Valley, which is now a deep lake owing to the collapse of the drainage tunnel in August 1925. Water is the bug-bear of the native miner, and of the Company too for that matter, in the alluvial basins. It may be argued that the sodden condition of such locations has prevented the native from reaching the deeper levels of the pay gravels and thus preserved them for the Company's use,

but if the Company collapses and no other similar organization comes forward to take its place, it is necessary to do all that can be done to foster and develop native mining and I fail to see why Government should forbid, say the use of small petrol-driven pumps for drainage purposes.

The ordinary license in force at present prohibits the use of explosives. How mining can be efficiently carried on by the *ludwin* system, in which the cemented, gem-bearing detritus filling limestone caves and cracks, or even by the other systems in certain cases, is difficult to understand. I know, as a matter of fact, that in the past, when the native miners have met with insuperable obstacles, the Company has been accustomed to send out responsible officials to remove them by blasting. I believe a regular scale of charges of this sort of work was in operation at one time. In the same way, if and when Government administers the native industry itself, the absolute prohibition of explosives is not in its own interest, but operations should be carried out at fixed rates by the official inspecting staff on proper application being made.

I heard much of this question on the mines and from a group of representative miners whom I met with, and at the request of the Subdivisional Officer, I was handed a letter on the subject which stated:—

Reduction of License Fees.

- (a) that the rate of Rs. 20 per head (*i.e.*, Rs. 60 for the minimum number of three men which the license demands) has been in force for about 35 years;
- (b) that the market is bad, working areas scarce and difficult to operate, owing to their isolation and thick overburden, unlike conditions in the earlier days there are now no easy working areas;
- (c) that the number of the population engaged in gemming at one time was about 5,000, whereas now only about 500 can afford to take out licenses;
- (d) that in view of these facts the license fee ought to be reduced to Rs. 10.

The burden of the arguments put forward to support these claims, was, that a reduction to Rs. 10 would enable such a greater number of persons to take out licenses that revenue would increase rather than diminish.

In the opinion of the officials of the Company a reduction of fees would not materially increase the number of licenses issued. It is pointed out that the fees are only one item of a licensee's expenses. A typical monthly budget may be taken as follows :—

Maintenance of licensee Rs. 25 per month	...	...	Rs.
Maintenance of three workmen Rs. 20 per month	...	...	25
Tools, timber, stores, etc., say Rs. 15	...	...	60
			15
			100
License fees, three men at Rs. 20	...	...	60
			160
	Total	...	160

If the license fees were reduced by half, the total value of gems to be recovered to make both ends meet would be Rs. 130 instead of Rs. 160, and it is exceedingly doubtful if so small a reduction, especially in such a speculative business would have any effect except to reduce revenue.

In the following table I give certain data relating to the revenue derived from these Royalties. Royalty Returns from 1891 to date :—

Royalty Returns from Licenses.

	Average Annual Amount.	Highest Year.	Lowest Year.
	Rs.	Rs.	Rs.
Decade 1891 to 1900	2,45,888	4,68,038 (1896)	1,27,685 (1891)
Decade 1901 to 1910	2,34,028	3,51,910 (1904)	1,21,054 (1909)
Decade 1911 to 1920	2,04,798	4,07,400 (1920)	62,880 (1916)
Six years 1921 to 1926	1,45,505	2,17,920 (1921)	93,440 (1925)

From the 1st March 1926 to January 1927, a collection of Rs. 65,920 has been credited to Government and from the present state of affairs, the official auditor does not think the collection for this year will exceed Rs. 73,000.

For the first three decades there has been a slow but marked decline and to parallel the present state of affairs we have to return to the middle of the war period. Except in so far as they both suffer from the past and prevailing depression in the gem market, especially for the poorer grades which form the bulk of the production, and are sold in the East, there is little in common between the afflictions of the Company and of the native miner, for they do not operate in the same areas.

The native miner complains that he is kept out of certain potential areas by the Company and that the latter does not even operate them itself. I have obtained a list of the reserved areas in the occupation of the Company in the Mogôk, Kathe, Khabain and Bernardmyo Circles, some of which have been acquired by purchase and others have been allotted by the Local Authorities. At the head of the Mogôk Valley there are 54.75 acres of unworked ground in the vicinity of Le-u, and in the Myintada Valley, an offshoot of the main one at the other end, there are some 39 acres purchased by the Company between 1901 and 1905. On geological grounds I consider the occurrence of payable ground in the Myintada Valley, as very problematical. The Le-u Reserve is more promising. In the Kathe Valley, omitting those sections both in Kathe, Saza-in and Kyaungdwin where the Company is working and permitting tribute operations, there are 44.8 acres of unworked ground, 19.3 acres in the Pama Valley, 65 acres in the Kyatpyin Valley and 63 acres at Sinkwa which have been partially worked. In the Khabain Circle, 12 acres have been partially worked and in the Bernardmyo Circle 11½ acres of partly worked ground and 45 acres of unworked ground, the property of the Company exist. Much of this ground is potential value and if it was thrown open, as it may be on the final liquidation of the Company, would doubtless be responsible for some increase in mining fees, especially if a few lucky finds were made by first comers, but that it alone would bring the fees back to their old order of magnitude, I do not believe, the trouble is deeper seated than that and lies most of all in the moribund state of the gem market. After all, 260.6 acres is not a great area in a Stone Tract occupying 600 square miles.

Another reason advanced for the falling off of revenue is the introduction of a system of tributing by the Company in 1925. Tribute mining takes many forms. Here, in Mogôk, the Company allots a particular site within its own reserved lands to an applicant who has to find labour and materials himself, accept legal responsibility for accidents and undertake to produce all gems found for the

Company's inspection. To see that he does so the latter stations a watchman in the tributor's sorting shed. The stones are valued by the Company and if the tributor agrees with this valuation he is paid fifty *per cent.* of the amount at once. If he does not so agree he can have the stones, on payment of half the valuation. In practise, with the exception of parcels estimated to be of high value, a broker or middleman intervenes between the Company and the tributor.

Opponents of the system (and they are to be found mainly amongst the ranks of the leading native licensees) assert that tributing has depleted the ranks of the mining labour open to themselves. They state also that numbers of licensed miners have given up their own operations and commenced tributing for the Company, but I was unable to obtain any reliable figures which would support this statement. The Company on the other hand, affirm that tributing was only commenced to relieve unemployment and not until distress was widespread and agitation was beginning to disturb the unemployed. That unemployment does exist is perfectly apparent. I believe that a large number of Chinese and Maingtha coolies have been removed lately from the Stone Tract under the powers conferred on the Subdivisional Officer by the Regulation. Personally, I do not see that tributing is doing much harm as long as it is confined to parts like the sides of the flooded out areas and to other tracts in the sole occupation of the Company. To extend it elsewhere, however, is another question. In normal circumstances, I do not approve of tributing in any shape or form as I believe it is a breach of Covenant 3 (Part VII) of the Model Lease as well as being objectionable in many other ways. But the lease of the Burma Ruby Mines, Limited, is anything but a model form and the legality or otherwise of wholesale tributing in the Stone Tract is a matter for the legal advisers of Government to decide. In the special conditions now prevailing in Mogôk, tributing finds employment for the idle who would otherwise find mischief at hand, and, in addition, brings a small but certain stream of ready cash into the coffers of a concern which badly needs it. Thus the accounts of the Company show the following figures for the period December 7th, 1925 to December 7th, 1926 :—

Tribute Mining.			
Expenses.		Receipts.	
	Rs. A. P.		Rs.
Cost of supervision	22,821 7 0	Value of stones sold at full value	... 56,243
Amount paid for stones taken into stock	... 28,121 8 0	Value of stones sold to Tributors	... 54,453
	50,942 15 0		1,10,696
Profit Rs. 59,753-1-0.			

A good deal of this came from portions of the Mogôk Valley which are now flooded, but tributing is still going on along from the banks of the lake, at the north-western end of the valley and at Kathe.

I cannot help thinking that a good deal of the opposition on the part of the wealthier native miners is due to the 50—50 basis of the arrangement, which they consider too high, for the gems so obtained come into competition with their own in the markets through the agency of the brokers. But these are matters of internal politics beyond my sphere. It would not be a bad thing if the Subdivisional Officer was asked to make quiet enquiries and report on the question. There are more matters of internal politics in it than meet the eye of an outsider.

Of course, if the attitude is adopted that it is best for the Company to disappear at once and for the native industry to find its proper level as soon as possible, then tributing stands condemned even under the special circumstances of the case.

By illicit mining I mean mining without a license rather than the thieving of gems or of ruby-bearing earth from areas actually worked by the Company, or from its washing plants and sorting sheds, for after all these latter malpractices concern the Company directly and it is its own business to guard against them. It is impossible for a visitor to the tract to form any sound conclusion as to the extent to which unlicensed miners operate. I cannot resist the conclusion however, that the probabilities are in favour of its occurrence on an extensive scale. The area occupied by gem-bearing ground of one kind and another is of great extent, the country mountainous, forest-clad and in parts inaccessible. To these facts must be added the smallness of the inspecting staff, which consists of two Europeans—Messrs. Bacon and Cowan, with a few Burmese assistants. This staff by reason of its minute size—however energetic it may be, is quite incapable of adequately supervising the whole of the Mogôk Stone Tract—of making those periodical and systematic examinations of all the valleys and hillsides as well as the surprise visits which the situation actually demands.

The most diverse opinions prevail as to the extent of the evil. The inspectors themselves declare as they naturally might be expected to do—that it is practically non-existent. There are others who state that it is rampant, that certain villages thrive on it, that pagodas and *pôngyi-kyaungs* are built from its proceeds and that *thugyis* and populace alike unite to deceive the investigator. I have heard it stated that a limited amount of illicit mining

ought to be connived at, as it is the unlicensed worker who is forced out on to outlying area and by his prospecting operations therein paves the way for later development !

Closely connected with this question is the curious local custom of *kanase*, by which women and girls enjoy the right to work in stream beds, tailings, races, and dumps from mines and washeries and remove any gems which they may discover, without the payment of license fees. This right descends from Burmese times and has never been questioned. I have seen upwards of 50 women sorting rejected gravel on the dumps of the old Redhill washer near Mogôk and the small gems which they discover are exposed for sale every evening in the streets of the town. It is doubtful if each worker makes more than a few annas per day, but it has happened in the history of the modern industry that a gem of great price has been so unearthed though this is a phenomenon of the greatest rarity and must be explained by a breakdown of the vigilant sorting process of the Company.

It has been argued that the right of *kanase* should be restricted to stream beds and not extended to tailings races and refuse material from any mine in order to prevent theft and the employment of more people than the license permits. On the major question as to whether the *kanase* right has been abused by native licensees, I can express no trustworthy opinion, owing to my short experience. An efficient inspecting staff ought to be able to prevent a licensee employing women to carry out more than the legitimate duties of mining and sorting proper. My general impression is that considerable discontent and great hardship would be entailed by prohibiting *kanase* entirely and I think it best to be chary in dealing with local customs which have descended from time immemorial.

The present Subdivisional Officer in Mogôk, who had only been appointed to the post, a few weeks before my arrival, naturally had no views on these matters but kindly furnished me with statements showing the number of cases tried in his own and the Additional Magistrate's Court for offences under section 6 (1) of the Upper Burma Ruby Regulation during 1926 and 1927. From these it appears that 66 cases were tried in 1925 and only 15 in 1926. I can offer no explanation of the remarkable difference in these figures.

On the expiry of the Company some organization must be created to control and supervise native mining. It is open to Government to "farm out" the right by auction and leave it to the buyer to see that he recovers his funds. Personally, I hope that this will not be done as it savours too much of the old Burmese methods and is open to many abuses.

The only other system available is for Government to appoint its own supervisory staff and administer the industry itself. The foregoing pages indicate some of the problems which are to be expected and the broad outlines of the manner in which they might be treated. A competent staff is essential and should be under the control of an energetic officer who would try to infuse life into the present moribund state of affairs. For a time, at any rate, the present staff might be kept on for the benefit of their local knowledge. I have purposely made no remarks on the question of areas to be granted to individual licensees, or the method of their demarcation, as I could obtain no data of value on these points. I am not in favour of staking out claims and would prefer to see rich areas, in which activity was displayed, properly surveyed into plots of a size to be determined, and allocated to applicants by a process analogous to that adopted in the case of mining areas elsewhere. It is time that gem mining in Burma was brought more into line with the general principles governing mining operations in other parts of the Province, with modifications to suit local traditions and customs.

APPENDIX III.

FUTURE MINING BY EUROPEAN METHODS.

In the preceding pages I have attempted to trace the history of the Burma Ruby Mines, Limited, from its formation soon after the annexation up to the present time. It is usually possible in enquiries of this kind to separate purely technical matters from those appertaining more to finance and official relationships, but in this case it cannot be done. Throughout the lengthy period of the Company's existence, hardly a year has passed without involved correspondence with the Secretary of State, or the Governments of India and Burma and there have been frequent alterations and modifications of the terms under which the Company pursued its operations. The detailed story of this concern's business must be without parallel in the wide field of Indian mining enterprise.

It would serve no useful purpose now to criticise the terms of the original lease but in view of the frequent charges of robbery which are made against Government by shareholders of the Company it is necessary to point out that Government did not fix the original rent at four lakhs of rupees per annum. It was rather a competitive bid made by the Company itself, and the Company alone is to be blamed for the fact that for four or five years this sum had to be paid out of capital, a procedure which crippled development from the commencement and has prevented proper exploration ever since that time.

Sir Hugh Barnes, the present Chairman, speaking at a meeting on November 20th, 1925, stated that "roughly the Government have received about £550,000 in cash out of the mines in the shape of rent, royalties and shares of profits, when profits were earned. The shareholders have received about £150,000 altogether in twelve dividends."

In another place he analysed these figures further dividing the amount received by Government in the first 34 years of the Company's existence as follows :—

In Rent	...	...	...	...	...	£
In Royalties in lieu of Rent	...	...	...	...	...	280,117
Less 10 per cent of collection since 1909	...	...	...	...	...	166,202
Arrears paid in 1919	...	...	...	...	...	8,799
Thirty per cent of profits	...	...	...	...	...	79,718
Total	...	...	...	...	...	534,836

In 15 years the Company made profits of £284,364

In 19 years the Company made losses of £181,279

or a net profit in 34 years of £103,085.

For the past 16 years only three small dividends have been paid. This is surely rather a fallacious method of dealing with the question though it may well appeal to the ignorant shareholders in London. Government has a perfect right to ask what they would have received from the native industry if the Burma Ruby Mines, Limited, had never existed at all.

As far as I can gather this amounts to no less a sum than Rs. 73,66,436 or (taking the rupee at 1/4) £491,095. If the cost of collecting these fees is allowed for, for the State could undoubtedly have gathered them in cheaper than the Company, the result is still more in Government's favour. Reckoned over the long period of 34 years and longer still for that matter, the grant of the concession to the Company has been a bad investment for Government. Compared with other mining concerns in Burma, as taxpayers, the Ruby Mines Company are futile.

To what causes are the failure of Company due? Is there any evidence to prove that the mines are really played out—that no further gem-bearing deposits exist? The present lease occupies an area of over 600 square miles. The greater part of this is composed of certain gneissic and associated rocks of Archaean age, whose exact composition need not be entered into here. Traversing them are great bands of crystalline limestone which stretch from the eastern bank of the Irrawaddy to beyond the longitude of Mogôk. In the south-eastern portion of the lease there is an area which contains none of these and which from a geological point of view should never have been included as it cannot yield any gem stones with the possible exception of Tourmaline, a semi-precious stone of no great price. The crystalline limestones have been proved to be the natural home of the ruby and the spinel. I have many specimens in my possession which show this beyond dispute. The sapphire is different in its occurrence, but even in the case of the blue stone, it can be safely asserted that it will not be found in the area mentioned.

The extent and size of these limestone bands have been roughly demarcated on La Touche's geological map of the Shan States. It is regrettable that neither La Touche nor his assistants had the time or opportunity to map them on the larger scale maps which exist. They confined their attention to the one-inch equals one mile surveys, as it would have meant spending more time than was permissible to study the larger scale topography in its geological exhibitions. For this reason La Touche's mapping, done on such a small scale can only be regarded as approximately correct and by no means complete. More of these limestone bands exist than he has shown.

From these limestones most of the precious stones and certainly all the rubies and spinels have been derived. Under the action of denudation, their weathered products in the course of the decay of the parent rock travel downhill to the stream beds where, as the case of the valley deposits worked by the Company proves, they are accumulated in the course of time. If gems exist in the alluvials of the valleys it follows beyond dispute that they are present also in the detrital deposits of the slopes, from which the true alluvials are derived.

The operations of the Company, apart from an abortive attempt to mine gems from the limestone, and one or two half-hearted efforts to prove the hill deposits, have consisted entirely in working the valley alluvials, confining their attentions to the Mogôk, Kyatpyin and Kathe Valleys. There are, however, other valleys in the stone tract and the question arises whether these have been sufficiently explored. It is exceedingly doubtful if they have, in particular the Kin and Khabine deposits. It is notoriously difficult to prospect this type of mineral deposit and no two geologists of experience would agree as to the reliability of the results so obtained. But it was surely the duty of the Company to put these questions beyond doubt. This has not been done, not through any fault of the local technical command but owing to the inattention of the Board of Control.

At this juncture I cannot refrain from writing an opinion which I have already expressed verbally, that the influence of the De Beers diamond concern has had more to do with the present position of mining for coloured gems in Burma than appears on the surface. The reasons for this are obvious, and it is significant that there has always been a powerful representative of the Great South African concern on the Board of the Burma Ruby Mines, Limited.

It has been stated to me repeatedly, and I see no reason to doubt the fact from my own view as a geologist, that there are great possibilities in the hillside deposits. They will certainly be more difficult to evaluate and occasional failures might result, but, in a speculative business like gem mining perhaps this does not matter much.

If any European Company then, or perhaps it would be better, to write, any concern able and willing enough to lay out the necessary funds to develop the ground by modern mining

methods as distinct from the ancestral Burmese ones is formed, either as a reconstituted Burma Ruby Mines, Limited, or as an entirely new organization, it is to these hillside deposits and the possibility of their large scale treatment by hydraulic mining that attention will have to be turned. I would again point out, however, even in this connection, that I do not consider that the remaining valley deposits have been adequately prospected and that there are patches of ground even in the Mogôk Valley itself which are still untouched. These lie under the present native town of Mogôk (though whether it would pay to remove it elsewhere to permit the gem-bearing gravels which certainly exist to be mined is another matter); under the site occupied by the offices and workshops of the Company, and further to the north; at the north-eastern end of the valley and elsewhere.

The Mogôk Stone Tract suffers from want of detailed large scale geological examination. There are no records of any purely geological investigations by the Company and with all due respect to the eminent mining engineers who have done their uttermost under the most disheartening difficulties, there are fundamental problems still to be solved which lie completely outside the ordinary knowledge or experience of those to whom the routine exploitation must be entrusted. The history of the Company proves that time after time the selection of a field for new enterprise, instead of being a matter of scientific certainty, has been a pure speculation, based for the most part on reports and rumours of the success of native miners.

The stretch of country usually referred to as the "Western Slopes" appears to merit first attention. It is a somewhat indefinite area lying on that side of the ranges between Berdardmyo and Kathe. Judged by the amount of native mining which has taken place within this portion of the stone tract, it is a gem-bearing zone of very great extent. The Company made one belated effort to test a part of it at Sinkwa, an attempt which did not succeed, but as this took place at the worst period of the Company's doleful history, when practically no funds were available, it is perhaps open to question whether it was a fair test or not.

Extensive areas of gem-bearing ground could be reached by the cutting of the Bernardmyo ditch which is a channel proposed by A. H. Morgan to lead water from the Bernardmyo stream 20 miles away. Its survey was completed in 1924 and the estimated cost was two lakhs of rupees. An alternative scheme is in existence, estimated to cost one lakh of rupees, the success of which depends on the quality of the ground at the Bernardmyo end of the Western Slopes.

In my opinion, no new Company should be given mining rights over the whole of the Mogôk Stone Tract. This only tends to diffuseness of effort and waste of capital. They should be asked to select a small area of a few square miles in which their energies should be concentrated. Such a policy would entail a radical modification of the existing lease, but I believe this would eventually prove profitable. There is no reason to suppose that the rights of the native miner could not be safeguarded within such an area, any more than it has proved impossible to protect the *Twinzayos* in the reserves at Yenangyauug. Such matters may be left for future discussion in the unlikely event of a company of the type contemplated coming forward.

